ADK-3582A Evaluation Board

HI-3582A/3583A, HI-3582/3583 Evaluation Kit Users Guide

April 2017

REVISION HISTORY

Revision	Date	Description of Change
AN-3582A, Rev. New	01-23-13	Initial Release
Rev. A	04-12-17	Change to new document format. Update BOM. Update IAR installation instructions.

Introduction:

The Holt HI-3582A/3583A ARINC 429 Evaluation Board demonstrates most features of the HI-3582A/3583A /3582/3583 3.3V Terminal IC. The HI-3582A/3583A Terminal IC features a single transmitter with integrated line driver and two receivers. The transmitter and both receivers feature 32 x 32 FIFOs. The device (HI-3582A/3583A) uses a 16-bit parallel data bus for interfacing to a microcontroller or FPGA.

The 2-board Holt evaluation kit uses an Atmel Cortex M3 32-bit microcontroller (MCU) to demonstrate the features of the device. The MCU is located on the lower board and a separate HI-3582A/3583A daughter card plugs on top of the MCU board. The daughter card can be removed from the lower board and used separately with another host FPGA /MCU interface. A serial port in the MCU displays ARINC 429 transmit and receive words on the console when the computer runs a terminal emulation program like HyperTerminal or TeraTerm. The demo program includes a menu of commands entered from the console to alter the configuration of the HI-3582A (either HI-3582A/HI-3583A) by modifying the Control Word register bits on-the-fly. Using the console commands provide a convenient way to learn the HI-3582A by making changes and seeing the effect on ARINC 429 words displayed on the console or by viewing the transmissions on an oscilloscope.
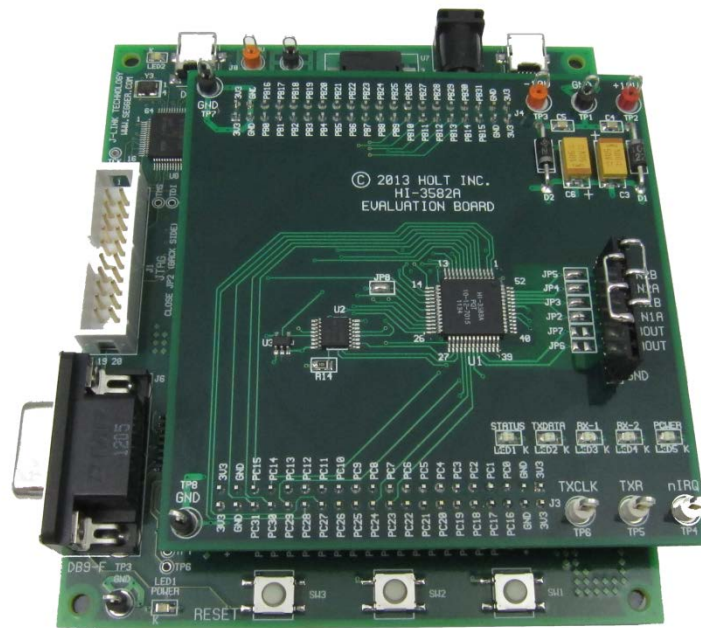
This guide explains how to quickly get set up and running. Additional support material and the full software project are provided in the included CD-ROM. Since the demo code is pre-programmed in the microcontroller flash , the demo is operational right out of the box. No software development tools are

needed to run the demo. The IDE toolset used to compile and debug this demo software project is IAR Systems Embedded Workbench® for ARM (32K KickStart Edition). More information is provided on the IAR toolset and software later in this document.

Evaluation Kit Contents

- This Application Note AN-3582A User's Guide.
- Cortex M3 lower board and schematic.
- HI-3582A/3583A plug-in daughter card and schematic.
- 8-pin jumper strip.
- HI-3582A/3583A Data Sheet.
- RS-232 9 Pin Serial Cable.
- Demo Project compatible with IAR Embedded WorkBench® for ARM
- Low-Level C drivers (module included in the project).
- CD-ROM containing all the documents and software.

Topics:

- Evaluation Board Block Diagram
- Evaluation Board set up
- Quick Start Guide
- Program Overview
- Flow charts
- IAR Embedded Workbench® for ARM software toolset
- Schematics diagrams and bill of materials
- Summary

Evaluation Board Block Diagram (two-board set)
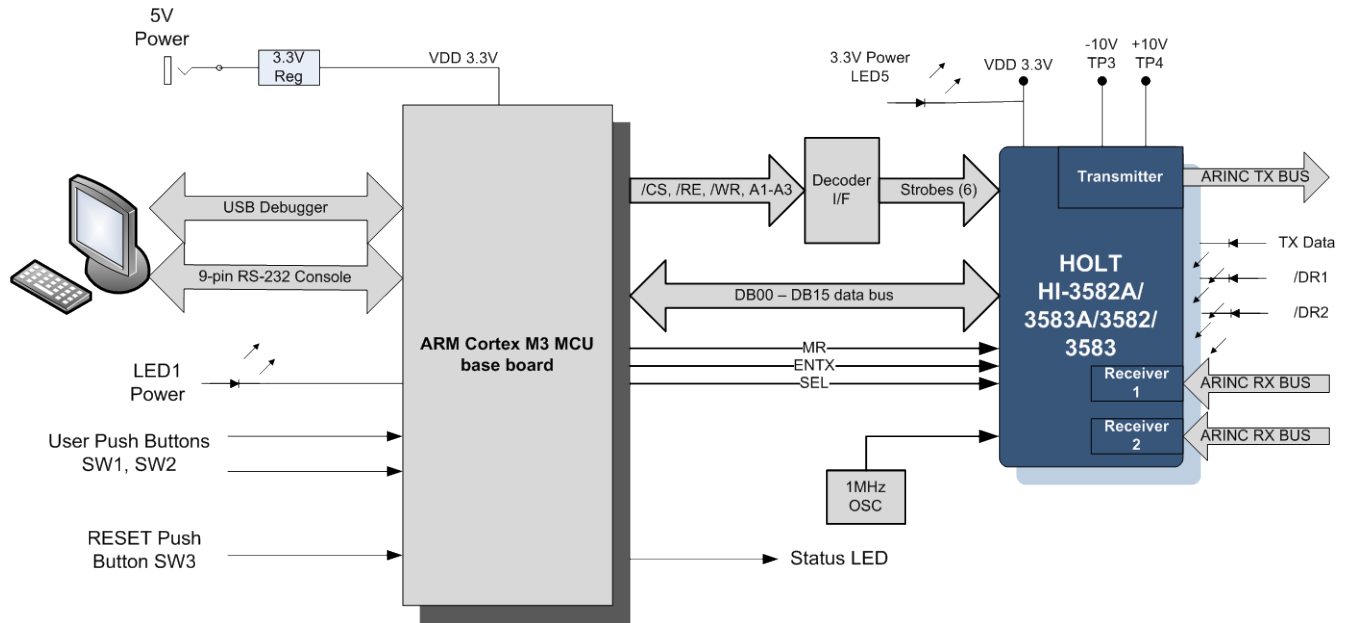
Demonstration Board Set Up

1. Connect the included 5V power adapter to the 5VDC IN jack.

2. Connect a bench power supply (not provided) with -10 volt, +10 volt and ground outputs to the daughter card test points:
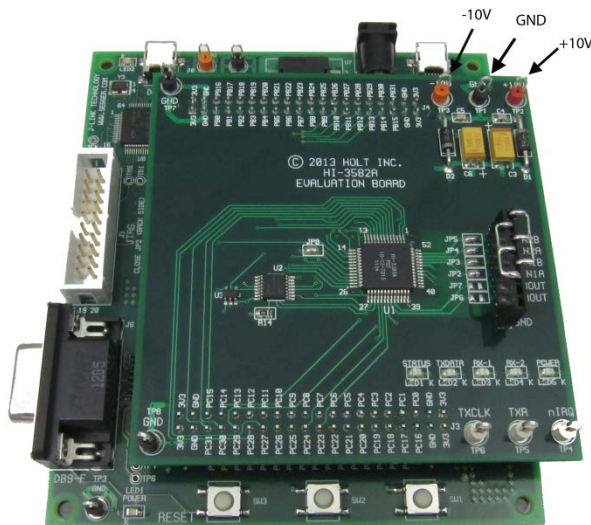
   TP3 = +10 volts.
   TP2 = -10 volts.
   TP1 = Ground.

3. Connect the included RS-232 cable between the board and the PC Serial (COM) port. Configure the serial communication on the PC for 115200 Baud, 8 bits, No Parity, No handshaking. If a PC Serial port is not available, an USB to Serial adapter may be needed (not provided). Four seconds after power up, the demo program starts loading the HI-3582A FIFO transmit register with ARINC 429 words and starts to transmit incrementing data words. ARINC 429 data words are viewable with an oscilloscope on J1 pins 5 and 6.

4. The daughter card should have an 8-pin jumper-plug inserted into J1 header. This connects the transmitter outputs to both receiver inputs. This jumper-plug is shown below and used in the demonstrations.

Quick Start Guide

1. After the demo board has been powered up, the MCU displays information on the console, starting with the name and revision of the program. The demo program then issues a master reset pulse to the HI-3582A and reads back the contents of the Status Register. If the value read is 0x0040, program execution continues. If any other value is read, the program displays "Part Not Detected" and the value from the Status register, then enters a perpetual loop.

```
*** Part Not Detected, Status Reg Invalid =0xXXXX
```

The demo program displays a menu of available commands and pauses for 4 seconds, then automatically begins transmitting ARINC data words. To view this menu for a longer time, press the space bar on the PC keyboard. Anytime during transmission, pressing the space bar will pause the program, or press the H (or h) key to display the menu again.

```
Holt Integrated Circuits HI-3582A/3583A Demo Board Ver: 1.0
 Compiled: Jan 23 2013 14:43:55

*** Part Detected ***
Status Reg Valid =0x0040
Control Word = 0x8030

*************************************************
   Holt Integrated Circuits HI-3582A/HI-3583A
        Compiled: Jan 22 2013 15:53:46
*************************************************

Press-0 to Enter Hardware Test mode, Pulse 74VC138 decoder outputs
Press-1 to Toggle Enable/Disable Receiver-1 label recognition
Press-2 to Toggle Enable/Disable Receiver-2 label recognition
Press-5 to Enable  Receiver-1 Encoder data9=0 and data10=0 bits
Press-6 to Disable Receiver-1 Encoder data9=0 and data10=0 bits
Press-7 to Enable  Receiver-2 Encoder data9=0 and data10=0 bits
Press-8 to Disable Receiver-2 Encoder data9=0 and data10=0 bits
```

```
Press f or F to Toggle between FIFO Empty and FIFO Full demonstration
Press l or L to load and read back 16 labels on Rec-1 and Rec-2
Press h or H to Display this Menu
Press m or M to apply a MR pulse to the HI-3582A/83A
Press p or P to Toggle Transmitter ARINC bit32 between data or Parity
Press s or S to Toggle the HI-3582A/83A between Scramble and Un-scramble mode
Press r or R to Toggle between HIGH SPEED and LOW SPEED
Press t or T to Toggle between Self-Test Mode and Normal Operation
Press SPACE BAR to Pause

Program will begin in 4 seconds, Press H to see this menu again.
```

2. With the jumper-plug inserted into J1, the console outputs the Status register and Control Word values, followed by a second line showing the transmitted 32-bit ARINC 429 word and 8-bit Label value. The program increments the upper 16 bits after each transmission of the ARINC 429 word, leaving the lower 16 bits of the words as 0x43LL, where LL represents the Label value. The default Label value is 0x01 and is displayed again for easy identification. Both receivers should display the same values as the preceding transmitter word and each transmission is separated by approximately a 320ms delay.

```
Status Reg =  0x0040    Control Word = 0x8030
Transmitter:  0x00004301  Label: 0x01
Receiver-1 :  0x00004301  Label: 0x01
Receiver-2 :  0x00004301  Label: 0x01

Status Reg =  0x0040    Control Word = 0x8030
Transmitter:  0x00014301  Label: 0x01
Receiver-1 :  0x00014301  Label: 0x01
Receiver-2 :  0x00014301  Label: 0x01

Status Reg =  0x0040    Control Word = 0x8030
Transmitter:  0x00024301  Label: 0x01
Receiver-1 :  0x00024301  Label: 0x01
Receiver-2 :  0x00024301  Label: 0x01
```

3. Press SW1 push button increments the Label value.

```
Status Reg =  0x0040    Control Word = 0x8030
Transmitter:  0x00024302  Label: 0x02
Receiver-1 :  0x00024302  Label: 0x02
Receiver-2 :  0x00024302  Label: 0x02
```

4.   Press SW2 push button decrements the Label value.

```
Status Reg =  0x0040    Control Word = 0x8030
Transmitter:  0x00024301  Label: 0x01
Receiver-1 :  0x00024301  Label: 0x01
Receiver-2 :  0x00024301  Label: 0x01
```

5. Remove the J1 jumper-plug. The display shows only the transmitter data.

```
Status Reg =  0x0040    Control Word = 0x8030
```

```
Transmitter:   0x00004301   Label: 0x01

Status Reg =   0x0040     Control Word = 0x8030
Transmitter:   0x00014301   Label: 0x01

Status Reg =   0x0040     Control Word = 0x8030
Transmitter:   0x00024301   Label: 0x01
```

6. While the program is transmitting ARINC 429 words, bus signals can be viewed with an oscilloscope on J1 pins 1-6. See schematic for the actual pin-out. If the jumper-plug is installed, connect the oscilloscope to the two connections on the top of the jumper.

7. To apply an external ARINC 429 transmitter source to either Receiver-1 or Receiver-2, first remove the jumper-plug on J1 and connect the RIINXA and RIINXB pins to the external transmitter. The demo program defaults to High Speed (100kbps) with no label recognition so any valid ARINC 429 word should be displayed by the demo board. If the external ARINC 429 transmitter is set to Low Speed, Press the 'R' key on the console to change the demo board to Low Speed.

8. Daughter card LEDs

LED	NAME	FUNCTION
LED1	Status	Flashes to show loop activity
LED2	TX Data	Turns on when TX FIFO loaded
LED3	RX-1 (Receiver-1)	Turns on when data is received
LED4	RX-2(Receiver-2)	Turns on when data is received
LED5	Power on (amber)	On to indicate 3.3V power

9. To learn more about the demo program, features and capabilities of the HI-3582A/3583A Terminal IC and IAR Embedded Workbench ®IDE software development tool, read the following sections.

Demo Program Overview

After the program completes the initialization and displays the header menu, the program executes a repeating main loop that transmits an incrementing data pattern, flashes LED1 on and off, checks for a button press on either SW1 or SW2 and polls each receiver for data reception. When receiver reception is detected, the program reads out the FIFO data and displays the data on the console. The serial port is checked at the end of the loop for possible console commands entered by key press. Console commands direct the MCU to modify the Control Register (CR) bits on-the-fly while the program transmits and receives ARINC 429 messages, so that the effects are immediately visible on the console or oscilloscope. A complete list of Console Commands is shown below and a full description of the sixteen Control Word (CR) bit fields is described on page 3 of the HI-3582A/3583A data sheet.

Console commands execute when the corresponding single letter or digit is pressed on the console PC keyboard. Letters can be entered in lower or upper case. Most commands pause the program and display the updated command status for one second, then automatically resumes transmission. For example, pressing the 'R' key executes the HIGH SPEED/LOW SPEED toggle command. Since the program defaults to High Speed after power up, the program will respond by displaying LOW SPEED (showing the new state) for one second, then begins Low Speed transmission.

LOW SPEED   (new speed is Low Speed)

Console Command List:

Press-0 :   Execute a hardware test sequence. The program sequentially reads each address which produces a negative pulse on the 74LVC138 decoder in an endless loop. Press the reset button to exit this test.

Press-1:   Toggles (CR1) enabling/disabling Label recognition for Receiver-1.

Press-2:   Toggles (CR3) enabling/disabling Label recognition for Receiver-2.

Press-5:   Enables Receiver-1 decoder (CR6) to only pass messages with bit9 and bit10 matches to CR7 and CR8 respectively.

Press-6:   Disables Receiver-1 decoder (CR6) (from command-5).

Press-7:   Enables Receiver-2 decoder (CR9) to only pass messages with bit9 and bit10 matches to CR10 and CR11 respectively.

Press-8:   Disables Receiver-2 decoder (CR9) (from command-7).

Press-Space Bar: Pauses the program and stops transmitter and receiver reception until any key is pressed.

Press-F: FIFO Empty/Full demonstration.
The demo program default after a power up, checks the transmit FIFO (SR7) not full and receiver FIFO contains valid data flags (SR0 and SR3) in the Status register before writing or reading the FIFO. This transmits and receives one message after the other one at a time. When command F is entered the program uses the transmit Full and the receiver empty flags. The program fills the transmit FIFO with 32. After the FIFO is full the program polls the receivers and reads all the FIFO data until the FIFO flags indicate empty.

Press-L   Loads all 16 labels from a "C" array to Receiver-1 and Receiver-2 label memories. Receiver-1 will have odd values and Receiver-2 will have even values. This command only loads the label memory. Command 1 or command 2 must be used to enable the label recognition to take effect.

```
Receiver-1 Labels Loaded:
0x01 0x03 0x05 0x07 0x09 0x11 0x13 0x15 0x17 0x19 0x21 0x23 0x25 0x27 0x29 0x31
Receiver-1 Labels Read:
0x01 0x03 0x05 0x07 0x09 0x11 0x13 0x15 0x17 0x19 0x21 0x23 0x25 0x27 0x29 0x31

Receiver-2 Labels Loaded:
0x00 0x02 0x04 0x06 0x08 0x10 0x12 0x14 0x16 0x18 0x20 0x22 0x24 0x26 0x28 0x30
Receiver-2 Labels Read:
0x00 0x02 0x04 0x06 0x08 0x10 0x12 0x14 0x16 0x18 0x20 0x22 0x24 0x26 0x28 0x30
```

Press-H   Displays the Console command menu.

Press-M   Issues a Master Reset pulse to the HI-3582A and writes the default Control Word value 0x8030 to Control Word register.

Press-P   Toggles CR4 in the Control Register to alter the transmitter 32nd bit between data or parity.

Press-S   Toggles CR15 in the Control Register to switch between Scrambled and Unscrambled data mode. See page 4 of the data sheet for a table showing the data mapping.

Press-R   Toggles CR0, CR13 and CR14 to reconfigure the transmitter and both receivers between low speed and high speed.

Press-T   Toggles CR5 to switch between Self-Test and Normal modes.

Software Program Flow-chart (main.c)

```
            ( Main.c Start )
                  |
    +-----------------------------+
    | Disable Interrupts, Config nMR |
    |   pin, Configure GPIO          |
    | Configure PB0 interrupt pin,   |
    |      Initialize Timer,         |
    | Configure ARM MCU EBI bus,     |
    |        Flash LED,              |
    |   Display console header       |
    +-----------------------------+
                  |
         +-----------------+
         | Initialize 3582A |
         +-----------------+
                  |
           /--------------\          +-----------------+
          / Check Status   \   N     | Display "Part Not |
         <  Reg for valid   >------->| Detected" and     |
          \    value?      /         |  Control Word      |
           \--------------/          |     value.         |
                  | Y               +-----------------+
                  |                           |
         +-----------------+           ( Dead loop )
         | Display "Part   |
         |  Detected" and  |
         | Control Word value. |
         +-----------------+
                  |
         +-----------------+
         | Write Default Control |
         |   Word, Enable        |
         | transmitter, enable   |
         | interrupts, Initialize|
         | first ARINC word      |
         |   value for TX        |
         +-----------------+
                  |
         +-----------------+
         | Display Console  |
         | Menu, Wait for 4 |
         |   seconds.       |
         +-----------------+
                  |
```

```
                        ( Main while loop )
                               |
         +-----------------------------+
         | Display Status Reg,          |
         | Control Word and Self-       |
         | Test on the console.         |
         +-----------------------------+
                               |
         +-----------------------------+
         | Load TX FIFO with            |
         | 32-bit word                  |
         +-----------------------------+
                               |
         +-----------------------------+
         | Flash the green status       |
         | LED1                         |
         +-----------------------------+
                               |
                    /--------------\         +-----------------+
                   / SW1 or SW2 button \  Y   | Increment or     |
                  <   pressed?          >---->| Decrement Label  |
                   \--------------/           | value for next   |
                          | N                 | transmission     |
                          |                   +-----------------+
         +-----------------------------+
         | Read Receiver                |
         | Data and display it          |
         | on the console               |
         +-----------------------------+
                               |
                    /--------------\         +-----------------+
                   / Check Console  \   Y    | Check            |
                  <  for commands?   >------>| console for      |
                   \--------------/          | comands and      |
                          | N                | execute          |
                          |                  +-----------------+
```

```
         ( ISR_MessageInterrupt )
         ( /DR1 falling edge )
                  |
         +-----------------------------+
         | Increment count variable     |
         | (user code inserted here)    |
         +-----------------------------+
                  |
           ( Return from interrupt )
```

Software Program Flow-chart, console commands

Chk_key_input()

Check for new char received from serial port? — Y

N

Return

Case 0	Y	Execute HW test (pulses on decoder)
Case 1	Y	Enable/Disable Rec-1 Labels
Case 2	Y	Enable/Disable Rec-2 Labels
Case 5		Enable Rec-1 encoder bit9/10
Case 6	Y	Disable Rec-1 encoder bit9/10
Case 7		Enable Rec-2 encoder bit9/10
Case 8	Y	Disable Rec-2 encoder bit9/10
Case space bar		Pause

Case F	Y	Toggle between FIFO modes
Case L	Y	Initialize Label memories for both receivers
Case H	Y	Display Help Console menu
Case M		Issue MR, configure CR with default
Case P	Y	Toggle bit32 between parity or data bit
Case R		Toggle between Low and High Speed
Case S	Y	Toggle between Scramble and unscrambled mode
Case T		Toggle between Self-Test and Normal Mode

Return

Holt Integrated Circuits

Using the HI-3582A/3583A Daughter card with an external MCU or FPGA

To use the daughter card with a different host, unplug the daughter card and make the necessary connections to the 16-bit bus signals, A1-A3 address lines, nWR ,nRD and nCS. All these signals are available on the J3 and J4 header pins. Apply a 3.3 volt supply to one of the J3 or J4 pins (pin 39 or pin 40). Connect a +10 volt supply to TP2 and -10 volt supply to TP3. The timing requirements for the 16-bit data bus and control signals are found in the product data sheet.

Daughter card Jumpers

TEST INPUT (Transmitter Disable) JP1 – This jumper is normally open. When it is closed, a high is asserted on the TEST input pin which disables the transmitter.

IC current measurement solder links JP8 and JP9 are provided to allow current measurements.

Line Driver resistor jumpers:

The HI-3582A includes two 37.5 ohm series resistors integrated into the transmitter outputs capable of driving the ARINC 429 bus directly so jumpers JP6 and JP7 should be shorted. These jumpers should be open if the HI-3583A is used. When a HI-3583A is used, the internal 10 ohm resistors in series with the external 27.4 ohm resistors will provide the needed 37.5 ohm output resistance.

Receiver input resistors:

Each receiver input line on the PCB has a jumper which bypasses a series 15K ohm resistor. Non-dashed numbered parts have internal 35K ohm input resistors. On -15 parts, the two internal resistors are 20K. These parts require external 15K ohm series resistors. Notes on the schematic show the proper jumper settings for using the -15 version of the part.

External resistors are used in lightning protection schemes implemented with external components. For information on lightning protection see AN-300 and AN-301 application notes.

IAR IDE Embedded Workbench® and ARM Cortex M3 Demo Project

The following steps install and configure the C compiler and describe how to load and modify the demonstration project using the HI-3582A/3583A Application Development Kit.

1. Installed IAR Systems *Embedded Workbench for ARM* (*EWARM* 7.1 or greater) is required BEFORE adding the Holt demo project, so all Atmel board library files and the demo project folder are created in the proper locations. Follow *the "Holt HI-3582A Demo Project Installation Guide"* found in the Project folder on the Holt CD-ROM. Before proceeding to the next steps IAR must be installed and the Holt project folder must be in the proper folder location, according to that guide. **Instructions beyond this point assume you have completed the above installation tasks.**

2. Launch IAR *Embedded Workbench* from the Windows Start menu. A blank screen should appear. Open the Holt HI-3582A Demo Project from the IAR File pull-down menu, click on File/Open/Workspace and navigate to the project folder location and select "HI-3582A_83A Demo.eww" and click the Open button.

3. Debug requires an interface between the computer running IAR Embedded Workbench® and the HI-3582A Application Development Kit. Connect the small end of the provided USB cable to the evaluation board USB connector marked DEBUG. Connect the other end of the USB cable to a free computer USB port. The IAR C-SPY Debugger for ARM includes drivers for numerous target system interfaces, including built in "J-link On Board".

   The first time the evaluation board USB cable is connected to the computer, the Windows "Found New Hardware" message should appear for the J-Link device. After several seconds, Windows should load the appropriate driver and advise, "Your hardware is ready for use". If Windows fails to find the J-Link driver, direct it to look in the Drivers directory the IAR Embedded Workbench® installation CD.

   If difficulties arise when initiating a debug session at step 5, click **Project** then **Options**. In the window that opens, under **Category** = **Debugger** highlight **J-Link/J-Trace**. Click the tab labeled **Connection**, then verify Communications = USB and Interface = SWD.

3. Open IAR Embedded Workbench®. Click **File**, then **Open Workspace**, then navigate to the project subdirectory created in step 4. Select the project file with .eww extension, then click **Open**. (The next time Embedded Workbench® opens, this project will appear in the Recent Workspaces list when **File** is clicked.)

4. If problems occur with IAR installation or with using the IAR debugger, two Holt technical notes are provided to help resolve these issues included on the Holt CD ROM.

5. The demo project only uses unsigned integer variables. Optionally turn off the nuisance compiler message that occurs when a variable's most significant bit toggles. The message looks like this:
    `Remark[Pe068]: integer conversion resulted in a change of sign`
    To disable this diagnostic message, click **Project** then click **Options**
    Category = C/C++ Compiler
    Tab = Diagnostics
    `Suppress these diagnostics:` add "Pe068" to list

6. RAM based projects are not supported due to the limited amount of RAM on the MCU. By design the Cortex™-M3 runs slower in RAM than in Flash so there is little need for a RAM based project.

    Compile the project by clicking the **Make** button. See following illustration. If the Build messages window in IAR Embedded Workbench® indicates no errors or warnings, you can continue. If errors occurred, correct them and recompile the program.

7. Initiate a debug session by clicking the **Restart Debugger** button. This downloads the compiled program into the MCU and readies the board for program execution. Click **Go** to start execution. Click **Break** (normally displayed during execution as a red upheld hand) to stop execution.
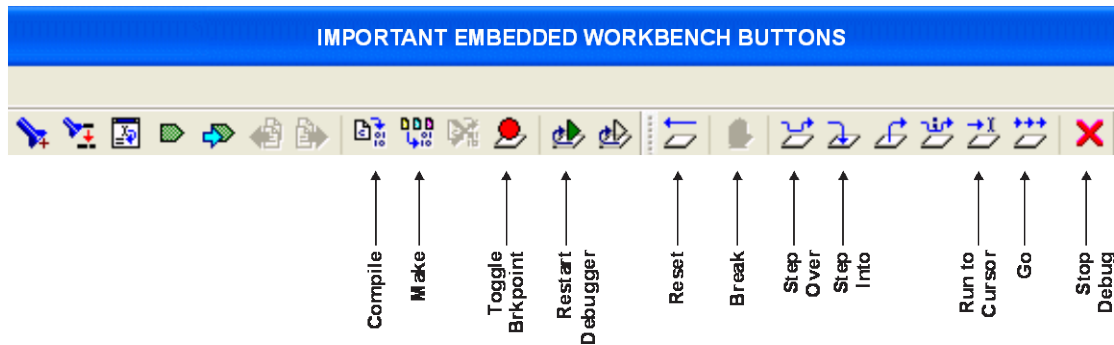
8. Click **Break** (normally displayed during execution as a red upheld hand) to stop execution.

Many of the project files are common to all Atmel Cortex M3 example projects located in the …\Atmel\at91sam3u-ek folder. The following is a list and description of the Holt specific HI-3582A/3583A demo project files.

Demo Project files:

Main.c	The main initialization and loop section of the program resides in this file.
Board_EBI.c	Contains code to initialize the (External Bus Interface) EBI interface for the parallel bus going to the HI-3582A/3583A 16-bit bus.
3582A_83A_Driver.c	
	Low-level drivers for the HI-3582A/3583A/3582/3583. This low-level drive module contains numerous support functions to allow writing to the HI-3582A/3583A Control Word and reading the Status register, enabling/disabling CR option control bits, initializing and enabling label recognition and other capabilities. This file and the associated header file can be used to start a new customer project using a different processor. Some changes may be required depending on the processor choice.
3582A_83A_Driver.h	Header file.
boardSupport.c	Miscellaneous functions.
boardSupport.h	Header file.
Common.h S	Common macros.
Interrupt.c	Interrupt module containing the ISR interrupt function. An ISR function is provided and executes when the Receiver-1 /DR1 signal goes low. Custom user code can be inserted here. A local variable "count" increments with each interrupt to demonstrate the function.
Interrupt.h	Header file.
Console.c	Serial Console input and output functions.
Console.h	Header file.
README.TXT	Provides revision history and other project information.

Summary

This Users Guide provides a Quick Start for demonstrating the HI-3582A/3583A evaluation board, a Users Guide for the software which demonstrates nearly all features of the Holt HI-3582A/3583A terminal IC, and provides an introduction to the IAR Embedded Workbench® software development toolset.

Item	Qty	Description	Reference	DigiKey	Mfr P/N
1	1	PCB, Bare, Eval Board	N/A	--------	JetTech 34539
2	4	Capacitor, Cer 0.1uF 20% 50V Z5U 0805	C1,C4,C5,C8	399-1176-1-ND	Kemet C0805C104M5UACTU
3	4	Cap Tant 10uF 50V 10% 2917	C2,C3, C6, C7	399-4770-1-ND	T498D106K050ATE1K0
4	1	Header, Male 1X8 .1" Pitch	J1	S1012E-08-ND	Sullins PEC08SAAN
5	2	Header, Male 2x20 .1" Pitch	J3,J4	S2012E-20-ND	Sullins PEC20DAAN
6	1	LED Amber 0805	LED5	160-1177-1-ND	LiteOn LTST-C170AKT
7	4	LED Green 0805	LED1 - LED4	160-1179-1-ND	LiteOn LTST-C170GKT
8	1	Osc, 1MHz, 3.3V, SMD, 3.35 x 5.15mm	OSC1	631-1317-1-ND	IDT XLH536001.0
9	2	Resistor, 27.4 1% 1/8W 0805	R6,R7	P27.4CCT-ND	PanasonicERJ-6ENF27R4V
10	1	Resistor, 39 5% 1/8W 0805	R12	P39ACT-ND	Panasonic ERJ-6GEYJ390V
11	5	Resistor, 330 5% 1/8W 0805	R8,R9,R10,R13,14	P331ACT-ND	Panasonic ERJ-6GEYJ331V
12	1	Resistor, 10K 5% 1/8W 0805	R1	P10KACT-ND	Panasonic ERJ-6GEYJ103V
13	4	Resistor, 15K 5% 1/8W 0805	R2,R3,R4,R5	P15KACT-ND	Panasonic ERJ-6GEYJ153V
14	2	Diode GP 1A 100V DO41	D1, D2	1N4002FSCT-ND	On Semi 1N4002
15	1	Test Point, Red Insulator, 0.062" hole	TP2(+10V)	36-5010-ND	Keystone 5010
16	3	Test Point, Black Insulator, 0.062" hole	TP1(Gnd),TP7(Gnd),TP8(Gnd)	36-5011-ND	Keystone 5011
17	3	Test Point, White Insulator, 0.062" hole	TP4(nIRQ),TP5(TXR),TP6(TXCLK)	36-5012-ND	Keystone 5012
18	1	Test Point, Orange Insulator, 0.062" hole	TP3(-10V)	36-5013-ND	Keystone 5013
19	1	HI-3582APQI - 48PQFP	U1	HOLT IC	Holt IC
20	1	IC Decode/Demux 3-8Line,16 TSSOP	U2	296-24670-1-ND	TI SN74LVC138AMPWTEP
21	1	IC Pos AND Gate, SOT23-5	U3	296-22345-1-ND	TI SN74LVC1G08MDBVREP

SIGNALS SHARED WITH MCU
(some pins not used)

PC[31:0]

PC0 A2
PC1 A3
PC2 A4
PC3 A5
PC4 A6
PC5 A7
PC6 A8
PC7 A9
PC8 A10
PC9 A11
PC10 A12
PC11 A13
PC12 nCS1
PC13
PC14 ENTX
PC15 SEL
PC16 /LED
PC17
PC18
PC19
PC20 A14
PC21 A15
PC22 TXR
PC23 /FFT
PC24 /HFT
PC25 /MR
PC26 /DR1
PC27 /HF1
PC28 /FF1
PC29 /DR2
PC30 /HF2
PC31 /FF2

PB[31:0]

PB0 /IRQ
PB1 /IRQ
PB2
PB4
PB5
PB6 D15
PB7 A0
PB8 A1
PB9 D0
PB10 D1
PB11 D2
PB12 D3
PB13 D4
PB14 D5
PB15 D6
PB16 D7
PB19 nRE
PB20 nCS0
PB23 nWE
PB24
PB25 D8
PB26 D9
PB27 D10

PB28 D11
PB29 D12
PB30 D13
PB31 D14

Installed Jumpers:
JP9, JP8

-10V   TP3
3V3
+10V   TP2
GND   TP1

1N4002 D2
10uF 50V C6
TP4 nIRQ
C5 0.1uF 50V
C2 10uF 50V
C1 0.1uF 50V
TP5 TXR
TP6 TXCLK

JP1 Shorted, DISABLE TRANSMITTER

SEL=0, BYTE0
SEL=1, BYTE1

C4 0.1uF
C3 10uF 50V
D1 1N4002
1MHz /MR
R1 10K   JP1
3V3

U2 74LVC138
A1 1 A 15 Y0
A2 2 B 14 Y1
A3 3 C 13 Y2
      12 Y3
6 G1 11 Y4
4 G2A 10 Y5
5 G2B 9 Y6
      7 Y7

R14 10K
nCS0
3V3

ENTX
SEL

nRE
nWE

JP8

U3A 74LVC08 SINGLE

MEMORY MAPPED IO ADDRESSES

0x60000000 = /EN1
0x60000001 = /EN2
0x60000002 = /CWSTR
0x60000003 = /RSR
0x60000004 = /PL2
0x60000005 = /PL1

U1 HI-3582A,3582A-15,3583A,3583A-15

52 /DR1
2   /HF1
1   /FF1
3   /DR2
5   /HF2
4   /FF2
30 TXR
32 /FFT
31 /HFT
43 TXCLK
51 RIN2B
50 RIN2A
49 RIN1B
48 RIN1A
35 TXBOUT
34 TXAOUT
33 V-
47 VDD
36 V+
42 CLK/MR
44 /MR
45 TEST
7   /EN1
8   /EN2
37 ENTX
6   SEL
41 /CWSTR
29 /RSR
28 /PL2
    /PL1
21 NC
20 VSS

9   BD15 D15
10 BD14 D14
11 BD13 D13
12 BD12 D12
13 BD11 D11
14 BD10 D10
15 BD09 D9
16 BD08 D8
17 BD07 D7
18 BD06 D6
22 BD05 D5
23 BD04 D4
24 BD03 D3
25 BD02 D2
26 BD01 D1
27 BD00 D0

J1 Header 1x8
1 RIIN2B
2 RIIN2A
3 RIIN1B
4 RIIN1A
5 TXBOUT
6 TXAOUT
7
8 GND

R2 15K
R3 15K
R4 15K
R5 15K
JP2
JP3
JP4
JP5

R6 27.4 JP6
R7 27.4 JP7

HI-3582A/3582, HI-3583A/3583, - JP2, JP3, JP4, JP5 Shorted.
HI-3582A-15, 3582-15, HI-3583A-15, 3583-15 - JP2, JP3, JP4, JP5 Open.
HI-3582/3583 (non A) : R2-R5 = 10K ohm.

HI3582A/3582 - JP6, JP7 Shorted.
HI3583A/3583 - JP6, JP7 Open.

R2-R5 = 15K ohm.

STATUS LEDS

/LED   Status
TXR   TX Data
/DR1   RX-1
/DR2   RX-2

R8 330 LED1 GREEN
R9 330 LED2 GREEN
R10 330 LED3 GREEN
R11 330 LED4 GREEN
R13 330 LED5 AMBER
3.3V Power

3V3

OSC1
1 OE
4 VCC
1.0 MHz
2 GD
3 OUT

C7 10uF 50V
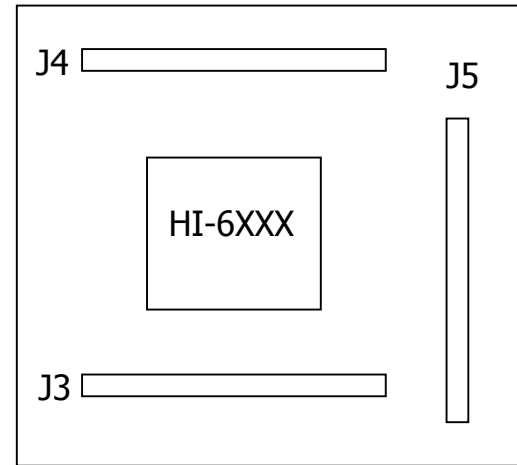C8 1uF 50V
R12 39 OHM
1MHz
3V3

Title HOLT INTEGRATED CIRCUITS HI-3582A DAUGHTER CARD
Size A
Document Number 3582A.DSN
Rev NEW
Date: Tuesday, January 29, 2013
Sheet 1 of 2

Item	Qty	Description	Reference	DigiKey	Mfr P/N
1					
2	1	PCB, Bare, Evaluation Board	N/A	--------	
3	1	Ferrite Bead, 220 Ohm @ 100MHz 300mA DC 0805	FB1	732-1602-1-ND	Wurth 742792034
4	2	Capacitor, Ceramic 10nF 10% 50V X7R 0603	C1,C42	490-1512-1-ND	Murata GRM188R71H103KA01D
5	2	Capacitor, Ceramic 10pF 10% NP0 C0G 0V 0603	C23,C34	490-1403-1-ND	Murata GRM1885C1H100JA01D
6	4	Capacitor, Ceramic 20pF 5% NP0 C0G 0V 0603	C14,C21,C25, C27	490-1410-1-ND	Murata GRM1885C1H200JA01D
7	29	Capacitor, Ceramic 100nF 10% 25V Y5V 0603	C2,C4,C6-C11,C13,C15-C19,C22, C24,C26,C28, C29, C33,C35-C40,C45-46,C54	490-1575-1-ND	Murata GRM188F51E104ZA01D
8	4	Capacitor, Tantalum 4.7uF 10% 10V Low ESR SMD 1206	C5,C20,C31, C32	478-2391-1-ND	AVX TPSA475K010R1400
9	4	Capacitor, Tantalum 10uF 10% 10V Low ESR SMD 1206	C3,C12,C30,C41	478-3317-1-ND	AVX TPSA106K010R1800
10	1	Capacitor 22uF 10% 6.3V Tantalum Low ESR SMD C	C43	399-10521-1-ND	Kemet T495C226K006ATE380
11	1	Capacitor 100uF 10% 6.3V Tantalum Low ESR SMD C	C44	495-1509-1-ND	Kemet T495C107K006ZTE150
12	1	Header, Male Shrouded 2x10, 0.1" Pitch	J1	HRP20H-ND	Assmann AWHW20G-0202-T
13	2	Connector, Receptacle USB Mini B Rt-Angle PCB Mount	J2,J8	H2959CT-ND	Hirose UX60-MB-5ST
14	1	Connector DB9F, Right-Angle PCB Short Body, Board Lock	J6	AE10924-ND	Assman A-DF-09-A/KG-T4S
15	1	Jack, DC Power, 2.5mm ID x 2.1mm pin	J7	CP-102AH-ND	Cui PJ-102AH
16	3	Receptacle, Female 2x20, 0.1" Pitch, 8.5mm Height, 3.2mm Solder Tails	J3,J4,J5	S6104-ND	Sullins PPTC202LFBN-RC
17	1	Solder Jumper	JP1	SOLDER OPEN	
18	2	Inductor, 10uH,100mA 0805	L1,L2	490-4029-1-ND	Murata LQM21FN100M70L
19	2	LED Green 0805	LED1,LED2	160-1179-1-ND	LiteOn LTST-C170GKT
20	0	Resistor, Prov 1/8W 0805	R1,R15,R16, R44,R45	DO NOT STUFF	
21	7	Resistor, 0 ohm 1/8W 0805	R9,R12,R13, R14,R22,R23, R29	P0.0ACT-ND	Panasonic ERJ-6GEY0R00V
22	2	Resistor, 1.0 5% 1/8W 0805	R7,R8	P1.0ACT-ND	Panasonic ERJ-6GEYJ1R0V
23	2	Resistor, 39 5% 1/8W 0805	R4,R5	P39ACT-ND	Panasonic ERJ-6GEYJ390V
24	1	Resistor, 150 5% 1/8W 0805	R17	P150ACT-ND	Panasonic ERJ-6GEYJ151V
25	1	Resistor, 4.7K 5% 1/8W 0805	R3	P4.7KACT-ND	Panasonic ERJ-6GEYJ472V
26	1	Resistor, 6.8K 5% 1/8W 0805	R6	P6.8KACT-ND	Panasonic ERJ-6GEYJ682V
27	0	Resistor, 47K 5% 1/8W 0805	R18	DO NOT STUFF	Panasonic ERJ-6GEYJ473V
28	0	Resistor, 68K 5% 1/8W 0805	R19	DO NOT STUFF	Panasonic ERJ-6GEYJ683V
29	11	Resistor,100K 5% 1/8W 0805	R2,R10,R11, R20,R21,R24, R25,R26,R27, R28,R42	P100KACT-ND	Panasonic ERJ-6GEYJ104V
30	3	Switch Tactile SPST 6 x 6 mm SMT	SW1,SW2,SW3	P12932SCT-ND	Panasonic EVQ-Q2B03W
31	2	Test Point, Black Insulator, 0.062" hole	TP2,TP3	5011K-ND	Keystone 5011
32	1	Test Point, Red Insulator, 0.062" hole	TP1	5010K-ND	Keystone 5010
33	1	IC, MCU 32-Bit 256KB Flash, 144-LQFP	U1	ATSAM3U4EA-AU-ND	Atmel ATSAM3U4EA-AU
34	2	4-Ch TVS ESD Protection SOT23-6	U2,U4	296-28203-1-ND	TI TPD4E001DBVR
35	1	IC, RS232 Driver/Receiver 3.0 to 5.5VDC 16-SOIC (3.9mm wide)	U3	296-19752-1-ND	Texas Inst MAX3232EIDR
36	1	IC Voltage Regulator 3.3V 1A LDO, SOT-223	U5	497-1228-1-ND	ST Micro LD1117AS33TR
37	1	PolyZen 5.6V PPTC protected Zener SMD	U6	ZEN056V130A24LSCT-ND	TE ZEN056V130A24LS
38	1	Filter, EMI 35dB 10A 1MHz-1GHz SMD	U7	490-5052-1-ND	Murata BNX022-01L
39	1	IC Voltage Ref 2.5V 1% Micropower SOT-23	VR1	576-1047-1-ND	Micrel LM4040DYM3-2.5
40	1	Crystal 12.00MHz, 50ppm 20pF, HC-49US leaded	Y1	631-1105-ND	Fox FOXSLF/120-20
41	1	Crystal, 32768 Hz 12.5pF cylinder leaded	Y2	535-9033-1-ND	Abracon AB26TRB-32.768KHZ-T
42	1	Capacitor, Ceramic 100nF, -20% / +80% 25V Y5V 0603	C66	490-1575-1-ND	Murata GRM188F51E104ZA01D
43	1	Capacitor, Ceramic 33pF, 5% 50V C0G 0603	C59	490-1415-1-ND	Murata GRM1885C1H330JA01D
44	2	Capacitor, Ceramic 15pF, 5% 50V C0G 0603	C60,C61	490-1407-1-ND	Murata GRM1885C1H150JA01D
45	1	Ferrite Bead, 220 Ohm @ 100MHz 300mA DC 0805	FB2	732-1602-1-ND	Wurth 742792034
46	1	Solder Jumper	JP2	SOLDER OPEN	
47	1	Resistor, 220 ohm 5% 1/10W 0603	R31	P220GCT-ND	Panasonic ERJ-3GEYJ221V
48	2	Resistor, 27 ohm 5% 1/10W 0603	R36,R38	P27GCT-ND	Panasonic ERJ-3GEYJ270V
49	5	Rubber Foot, Bumpon Black Hemisphere, .312 X.200 H	Place at 4 corners and center	SJ5746-0-ND	3M SJ61A1

USB2.0 PORT

USB DEBUG PORT

JTAG/ DEBUG PORT

SERIAL PORT

POWER SUPPLY

J4

J5

ARM CORTEX M3 MCU

J3

BUTTONS
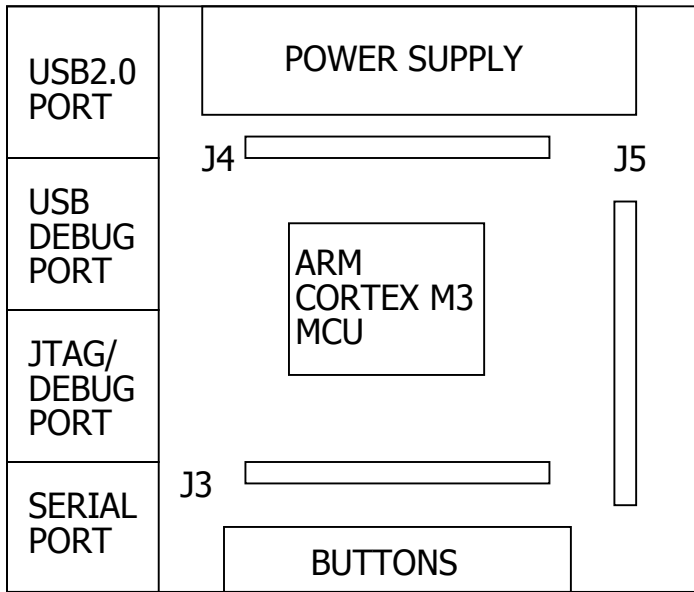
LOWER CIRCUIT BOARD

J4

J5

HI-6XXX

J3

STACKING UPPER CIRCUIT BOARD

J3,J4 & J5 ARE DUAL-ROW STACKING RECEPTACLES (LOWER BOARD) AND HEADERS (UPPER BOARD).

PA[31:0]

PB[31:0]

U1A
SAM3U

PA0	109	PA0/WKUP0	PB0/PWMH0	53	PB0
PA1	111	PA1/WKUP1	PB1/PWMH1	55	PB1
PA2	113	PA2/WKUP2	PB2/PWMH2	57	PB2
PA3	115	PA3/CK	PB3/AD12BAD2	79	PB3
PA4	117	PA4/CDA	PB4/AD12BAD3	80	PB4
PA5	119	PA5/DA0	PB5/AD1	65	PB5
PA6	121	PA6/DA1	PB6/D15	66	PB6
PA7	123	PA7/DA2	PB7/A0/NBS0	67	PB7
PA8	128	PA8/DA3	PB8/A1	68	PB8
PA9	130	PA9/TWD0	PB9/D0	31	PB9
PA10	132	PA10/TWCK0	PB10/D1	30	PB10
PA11	133	PA11/URXD	PB11/D2	59	PB11
PA12	134	PA12/UTXD	PB12/D3	61	PB12
PA13	87	PA13/MISO	PB13/D4	62	PB13
PA14	88	PA14/MOSI	PB14/D5	29	PB14
PA15	91	PA15/SPCK	PB15/D6	97	PB15
PA16	93	PA16/NPCS0	PB16/D7	96	PB16
PA17	95	PA17/WKUP7	PB17/NANDOE	26	PB17
PA18	99	PA18/WKUP8	PB18/NANDWE	25	PB18
PA19	100	PA19/WKUP9	PB19/NRD	24	PB19
PA20	101	PA20/TXD1	PB20/NCS0	23	PB20
PA21	102	PA21/RXD1	PB21/A21/NANDALE	21	PB21
PA22	77	PA22/RTS1	PB22/A22/NANDCLE	20	PB22
PA23	103	PA23/CTS2	PB23/NWR0/NWE	19	PB23
PA24	105	PA24/WKUP11	PB24/NANDRDY	15	PB24
PA25	106	PA25/WKUP12	PB25/D8	14	PB25
PA26	107	PA26/TD	PB26/D9	13	PB26
PA27	64	PA27/PCK0	PB27/D10	12	PB27
PA28	45	PA28/TK	PB28/D11	10	PB28
PA29	46	PA29/PWMH1	PB29/D12	8	PB29
PA30	78	PA30/TF	PB30/D13	6	PB30
PA31	48	PA31/RF	PB31/D14	5	PB31

PC[31:0]

PC[31:0]

PC0	110	PC0/A2	PC16/NCS2	82	PC16
PC1	112	PC1/A3	PC17/AD12BAD6	83	PC17
PC2	114	PC2/A4	PC18/AD12BAD7	84	PC18
PC3	116	PC3/A5	PC19/NPCS1	32	PC19
PC4	118	PC4/A6	PC20/A14	108	PC20
PC5	120	PC5/A7	PC21/A15	22	PC21
PC6	122	PC6/A8	PC22/A16	47	PC22
PC7	124	PC7/A9	PC23/A17	49	PC23
PC8	129	PC8/A10	PC24/A18	54	PC24
PC9	131	PC9/A11	PC25/A19	56	PC25
PC10	89	PC10/A12	PC26/PWMH2	58	PC26
PC11	92	PC11/A13	PC27/A23	63	PC27
PC12	94	PC12/NCS1	PC28/DA4	69	PC28
PC13	98	PC13/RXD3	PC29/DA5	70	PC29
PC14	28	PC14/NPCS2	PC30/DA6	71	PC30
PC15	81	PC15/NWR1/NBS1	PC31/DA7	72	PC31

ARM CORTEX M3 PIO

HOLT INTEGRATED CIRCUITS, Mission Viejo, CA, USA

Title
ARM CORTEX M3 MICROCONTROLLER BOARD

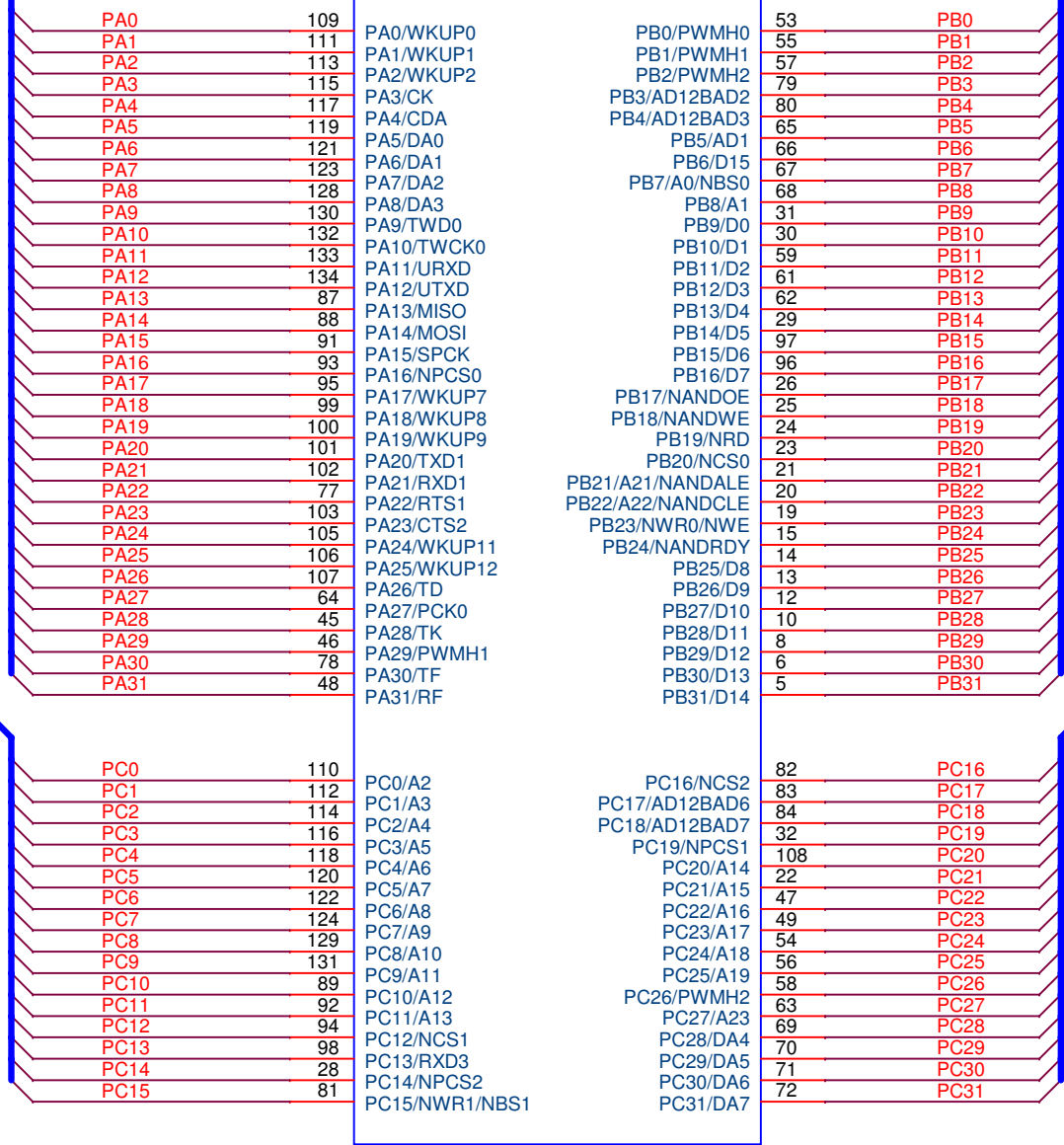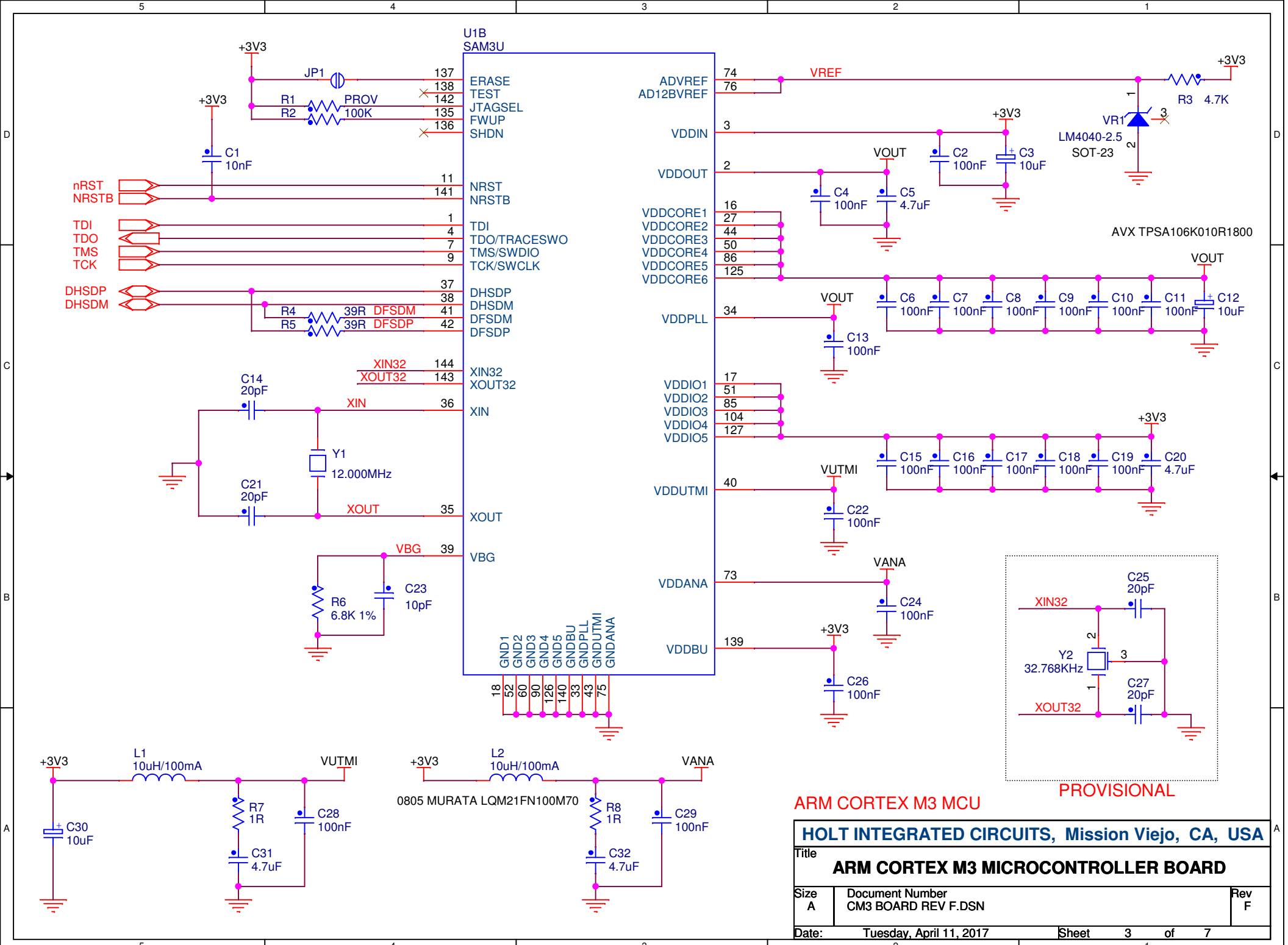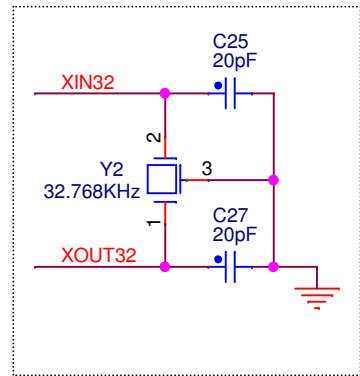| Size A | Document Number CM3 BOARD REV F.DSN | Rev F |

Date: Tuesday, April 11, 2017   Sheet 2 of 7

ARM CORTEX M3 MCU

PROVISIONAL

HOLT INTEGRATED CIRCUITS, Mission Viejo, CA, USA

Title	**ARM CORTEX M3 MICROCONTROLLER BOARD**		
Size A	Document Number CM3 BOARD REV F.DSN		Rev F
Date:	Tuesday, April 11, 2017	Sheet 3 of 7	

U1B SAM3U

AVX TPSA106K010R1800

0805 MURATA LQM21FN100M70

{1,4} PA[31:0]
{1,3,5} PB[31:0]
{1,3} PC[31:0]

J3 — Header 2x20

+3V3	1	2	+3V3
	3	4	
PC0	5	6	PC16
PC1	7	8	PC17
PC2	9	10	PC18
PC3	11	12	PC19
PC4	13	14	PC20
PC5	15	16	PC21
PC6	17	18	PC22
PC7	19	20	PC23
PC8	21	22	PC24
PC9	23	24	PC25
PC10	25	26	PC26
PC11	27	28	PC27
PC12	29	30	PC28
PC13	31	32	PC29
PC14	33	34	PC30
PC15	35	36	PC31
	37	38	
+3V3	39	40	+3V3

J4 — Header 2x20

+3V3	1	2	+3V3
	3	4	
PB0	5	6	PB16
PB1	7	8	PB17
PB2	9	10	PB18
PB3	11	12	PB19
PB4	13	14	PB20
PB5	15	16	PB21
PB6	17	18	PB22
PB7	19	20	PB23
PB8	21	22	PB24
PB9	23	24	PB25
PB10	25	26	PB26
PB11	27	28	PB27
PB12	29	30	PB28
PB13	31	32	PB29
PB14	33	34	PB30
PB15	35	36	PB31
	37	38	
+3V3	39	40	+3V3

J5 — Header 2x20

+3V3	1	2	+3V3
	3	4	
PA0	5	6	PA16
PA1	7	8	PA17
PA2	9	10	PA18
PA3	11	12	PA19
PA4	13	14	PA20
PA5	15	16	PA21
PA6	17	18	PA22
PA7	19	20	PA23
PA8	21	22	PA24
PA9	23	24	PA25
PA10	25	26	PA26
PA11	27	28	PA27
PA12	29	30	PA28
PA13	31	32	PA29
PA14	33	34	PA30
PA15	35	36	PA31
	37	38	
+3V3	39	40	+3V3

+3V3 R10 100K
+3V3 R11 100K

PB17 R12 0
PA7 R44 PROV
nSW1 — SW1

PB18 R13 0
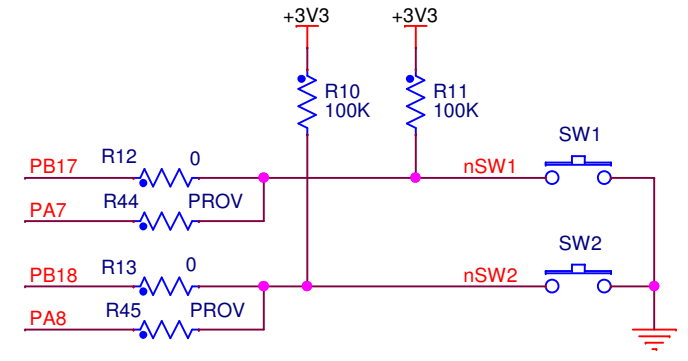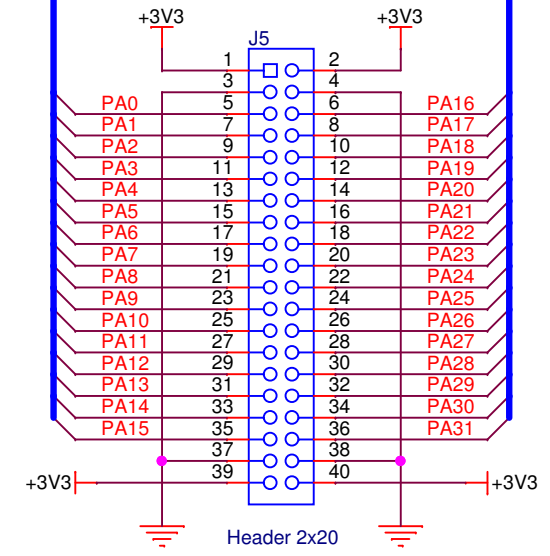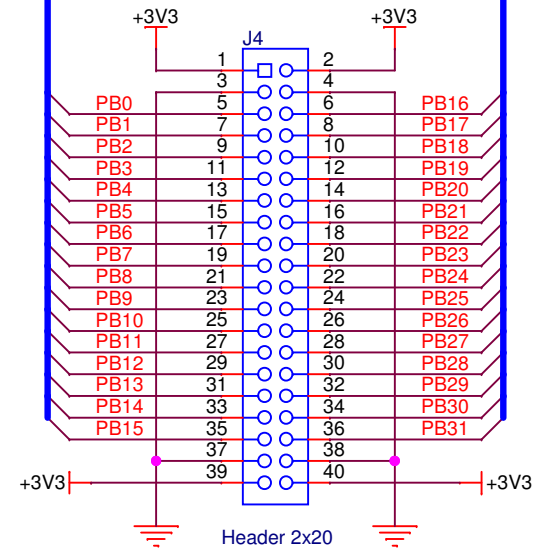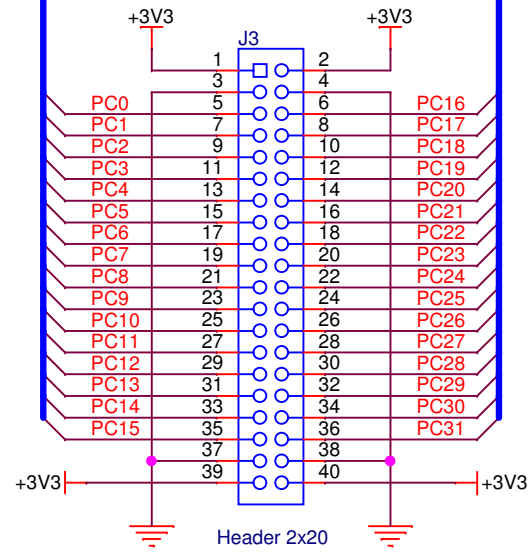PA8 R45 PROV
nSW2 — SW2

BOARD I/O HEADERS, BUTTONS

HOLT INTEGRATED CIRCUITS, Mission Viejo, CA, USA

Title
ARM CORTEX M3 MICROCONTROLLER BOARD

Size A
Document Number CM3 BOARD REV F.DSN
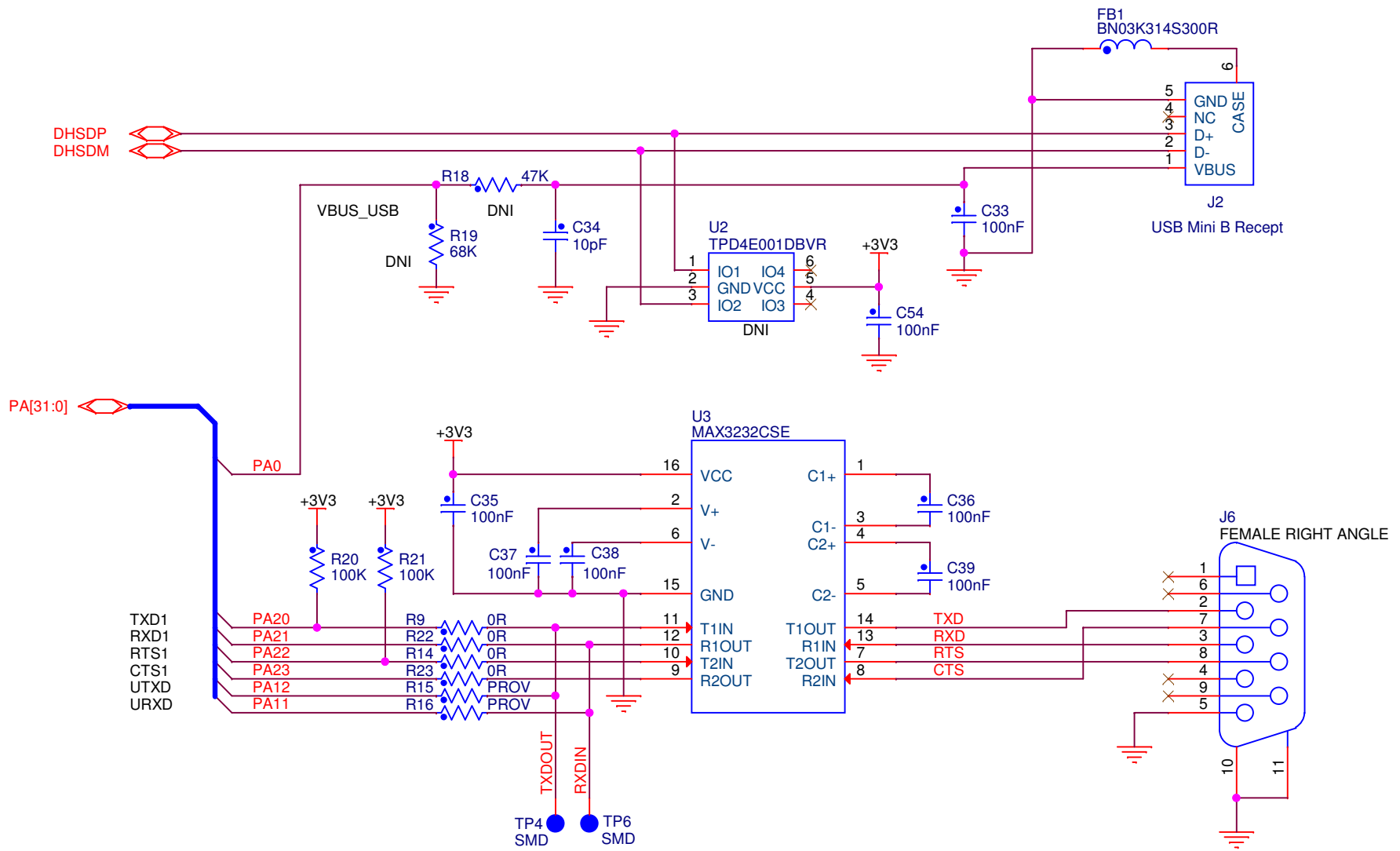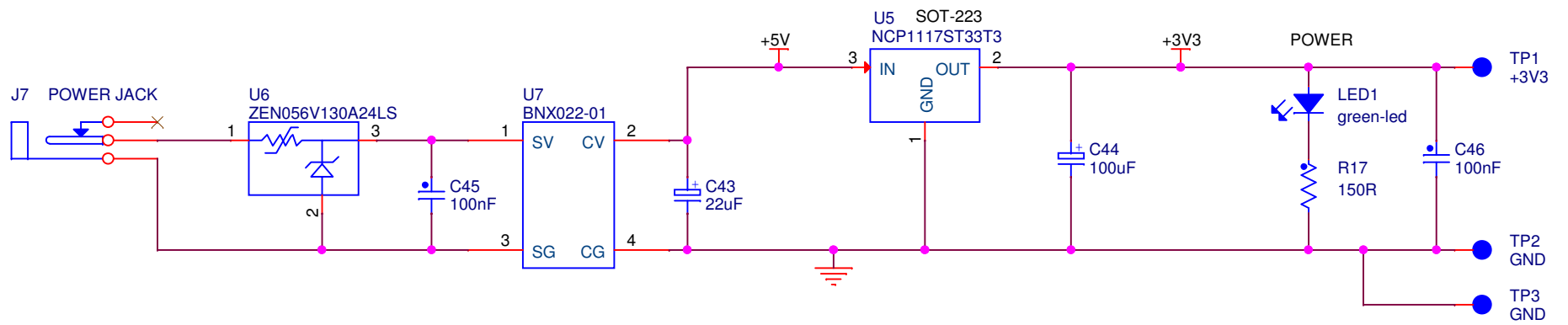Rev F

Date: Tuesday, April 11, 2017   Sheet 4 of 7

DHSDP
DHSDM

PA[31:0]

FB1
BN03K314S300R

5	GND	CASE
4	NC	
3	D+	
2	D-	
1	VBUS	

6

J2
USB Mini B Recept

R18　47K
VBUS_USB　　DNI

R19
68K
DNI

C34
10pF

U2
TPD4E001DBVR

1	IO1	IO4	6
2	GND	VCC	5
3	IO2	IO3	4

DNI

+3V3

C54
100nF

C33
100nF

PA0

U3
MAX3232CSE

+3V3

C35
100nF

+3V3　+3V3

R20　R21
100K　100K

C37　C38
100nF　100nF

16	VCC	C1+	1
2	V+	C1-	3
6	V-	C2+	4
15	GND	C2-	5
11	T1IN	T1OUT	14
12	R1OUT	R1IN	13
10	T2IN	T2OUT	7
9	R2OUT	R2IN	8

C36
100nF

C39
100nF

J6
FEMALE RIGHT ANGLE

TXD1　PA20　R9　0R
RXD1　PA21　R22　0R
RTS1　PA22　R14　0R
CTS1　PA23　R23　0R
UTXD　PA12　R15　PROV
URXD　PA11　R16　PROV

TXD
RXD
RTS
CTS

TXDOUT
RXDIN

TP4　TP6
SMD　SMD

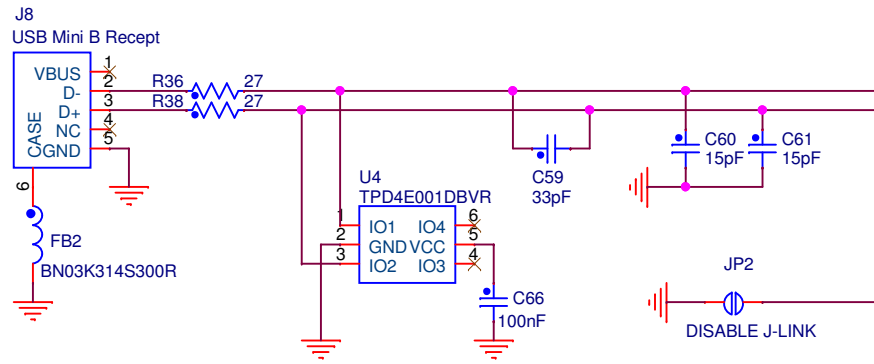|	
1	
6	
2	7
7	3
3	8
8	4
4	9
9	5
5	

10　11

USB & RS-232 SERIAL

HOLT INTEGRATED CIRCUITS, Mission Viejo, CA, USA

Title
ARM CORTEX M3 MICROCONTROLLER BOARD

Size A	Document Number CM3 BOARD REV F.DSN	Rev F

Date:　　Tuesday, April 11, 2017　　Sheet　5　of　7

POWER SUPPLY

J7 POWER JACK

U6
ZEN056V130A24LS

U7
BNX022-01
SV CV
SG CG

C45
100nF

C43
22uF

+5V

U5 SOT-223
NCP1117ST33T3
IN OUT
GND

C44
100uF

+3V3

POWER

LED1
green-led

R17
150R

C46
100nF

TP1
+3V3

TP2
GND

TP3
GND

USB DEBUG INTERFACE

+3V3 — LED2 green-led — R31 220
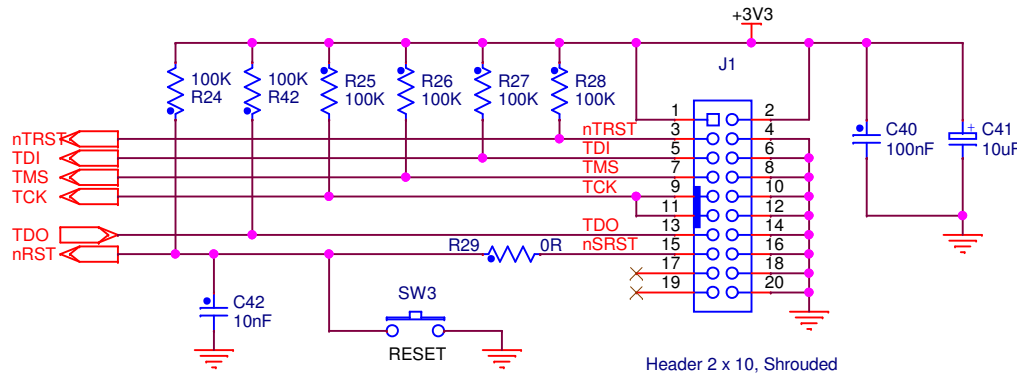
SEGGER J-LINK ON-BOARD DEBUGGER INTERFACE

(CONFIDENTIAL)

NOT PART OF A CUSTOMER DESIGN, THIS BLOCK IS COMPRISED OF U8, Y3, C47-C53, C55-C58, C62-C65, R30, R32-R35, R37, R39-R41 AND R43.

J8
USB Mini B Recept

VBUS	1
D-	2
D+	3
NC	4
CASE GND	5
	6

R36 27
R38 27

FB2
BN03K314S300R

U4
TPD4E001DBVR

1	IO1	IO4	6
2	GND	VCC	5
3	IO2	IO3	4

C66 100nF

C59 33pF

C60 15pF   C61 15pF

JP2

DISABLE J-LINK

TDI
TMS
TCK
TDO
nRST

DEBUGGER INTERFACE COPIED FROM ATMEL ARM CORTEX M3

USE THIS TO CONNECT J-LINK IF ABOVE CIRCUITRY IS NOT POPULATED OR WHEN IT IS DISABLED BY JUMPER JP2.

+3V3

PARALLEL DEBUG INTERFACE

nTRST
TDI
TMS
TCK

TDO
nRST

100K R24   100K R42   R25 100K   R26 100K   R27 100K   R28 100K

J1

nTRST	1	2
TDI	3	4
TMS	5	6
TCK	7	8
	9	10
	11	12
TDO	13	14
nSRST	15	16
	17	18
	19	20

R29 0R

C40 100nF   C41 10uF

C42 10nF

SW3

RESET

Header 2 x 10, Shrouded