HOLT INTEGRATED CIRCUITS

August 12, 2011

AN - 165

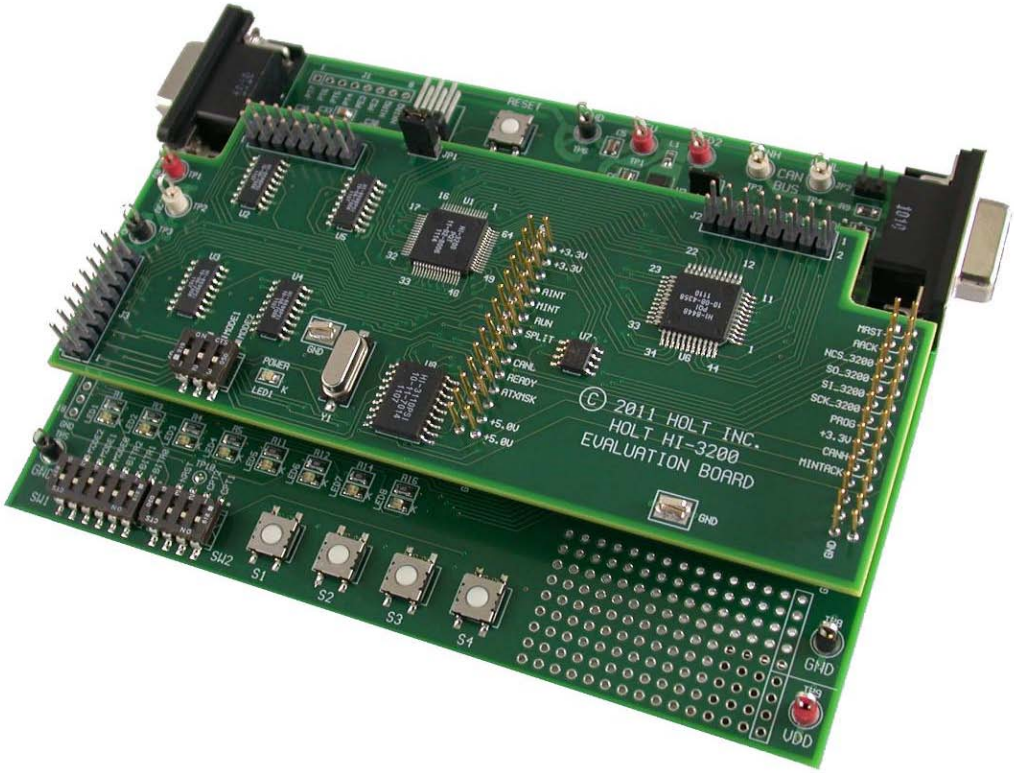
HI-3200 Avionics Data Management Engine Evaluation Board – User's Guide

Introduction:

The Holt HI-3200 Data Management Evaluation Board demonstrates most of the features of the HI-3200 ARINC 429 – CAN Bus Bridge. The HI-3200 features 8 ARINC 429 receive channels, 4 ARINC 429 transmit channels, CAN Bus / ARINC 825 interface, programmable filters, schedulers and auto-initialization. A Freescale MC9S12XDT512 microcontroller communicates with the HI-3200 through the SPI interface. The main board "General Purpose SPI Evaluation Board" includes switches and LEDs to help navigate the operating modes and confirm data and status information. A Serial UART port allows debug and data messages to be sent to a PC using any terminal program such as HyperTerminal. The HI-3200 Evaluation Board is a daughter card that plugs on to the General Purpose SPI board via two 26 pin connectors.

The HI-3200 evaluation board can be used separate from the General Purpose SPI board if the user would like to interface their own host SPI connections.

This Users Manual provides a more detailed description of the evaluation board and demo program than in the Quick Start Guide.

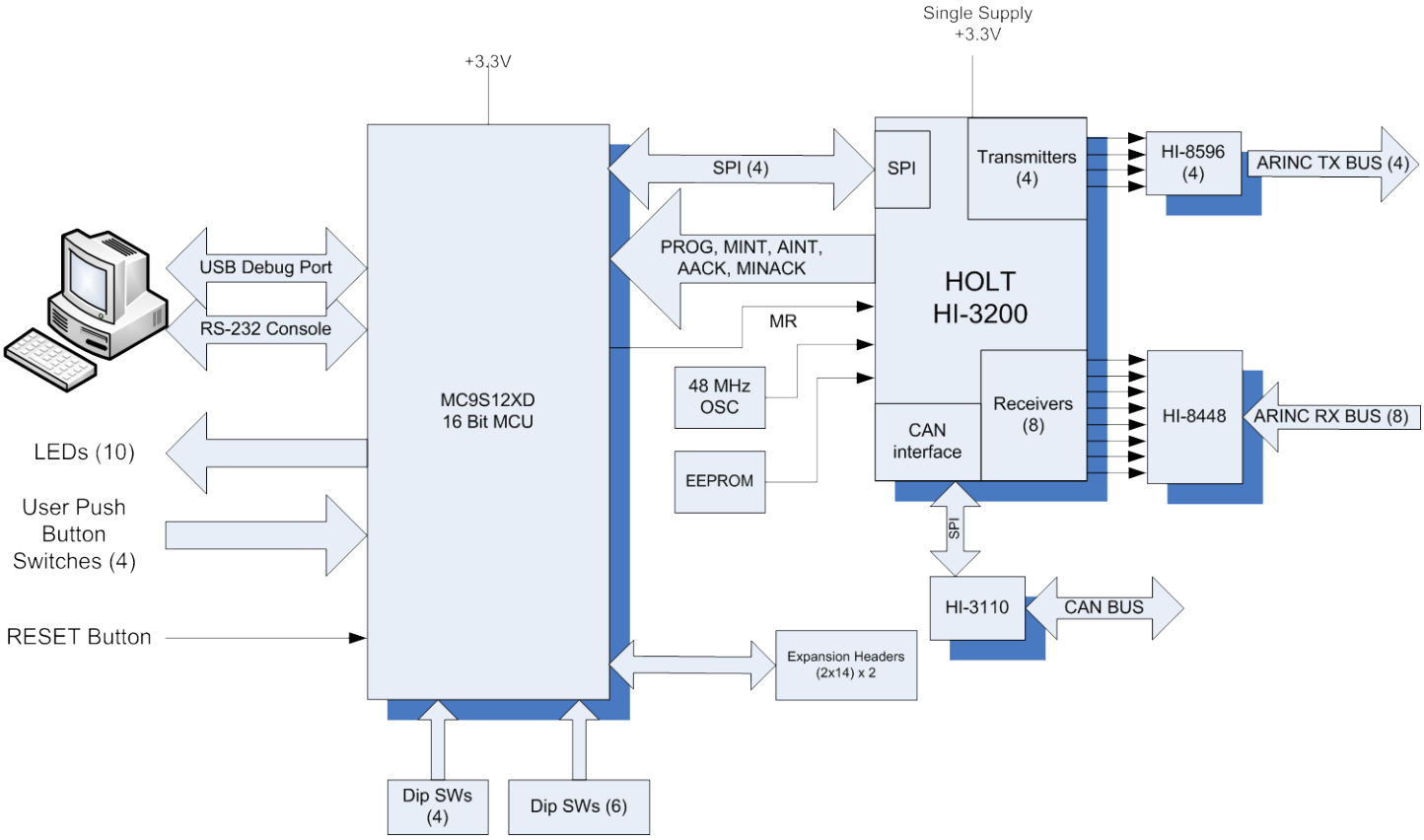


General Purpose SPI Board

The bottom main board is a general purpose board used to demonstrate a variety of Holt devices.

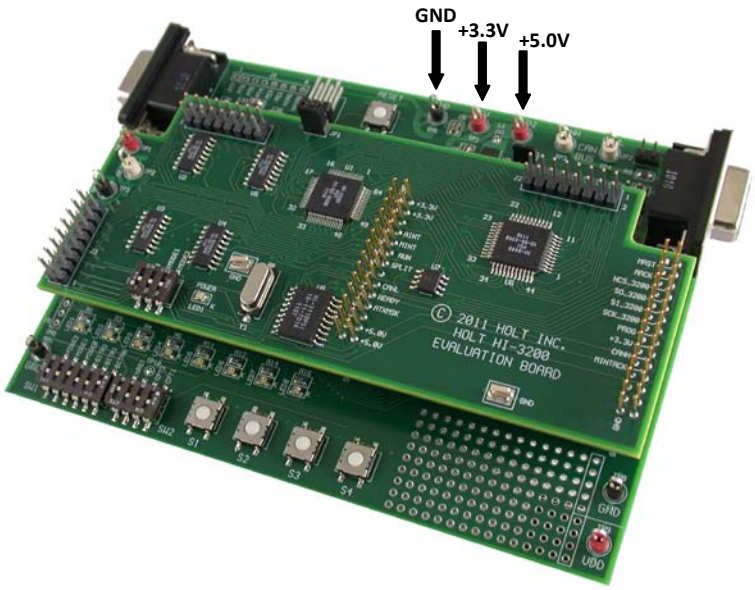
The schematic of this board will have slightly different references for some of the dip switches. For this application BITRATE0,1,2 are not programmed. If in doubt refer to the HI-3200 Quick Start Guide and applications note for the proper use of these DIP switches. IC U3 on this main board is not populated as the HI-3110 is available on the HI-3200 daughter card. For this application the 9-pin D connector J2 is used to connect to a CAN bus if TP3 and TP4 are not used.

Evaluation Board Block Diagram



Initial Board Set up

1. Connect a +3.3V power supply to TP1 and ground to TP6. The HI-3200 uses +3.3V. Connect +5.0V to TP2, the HI-3110 used to transfer CAN frames, uses +5.0V. The HI-8596s on the daughter card used to generate ARINC bipolar differential signals only require a +3.3V supply.



2. Connect the RS-232 cable to the board and the PC Serial (COM) port. Some features are only available using commands from the Console. To view ARINC 429/825 messages, and Control registers, a terminal program such as Hyper Terminal may be used. Configure the communication for 115,200 Baud, 8 bits, No Parity, No handshaking.

3. A user-provide PE Micro “USB Multilink Interface” debug cable must be connected when using Freescale Code Warrior™ for project software changes, program debugging and MCU reprogramming. The USB Debug connector is used for downloading code to the board from the Freescale IDE and is not required for a standalone demo.

4. HI-3200 daughter card default jumper settings:

   JP1 – closed
   SW1-1,2,3 open

Main Board Settings

Power On Reset

For normal operation ensure SW2 – 4 (MRST) is in the open position otherwise the MCU will be held in the reset state. The purpose of this MRST Dip switch is to allow easy interfacing of an external MCU to the HI-3200 (the SPI signals from the Freescale MCU will be forced into high impedance so as not to conflict with an external MCU). For normal operation keep this switch open and use the RESET button to reset the MCU during testing.

Some jumpers do not apply to the HI-3200 so they will typically be shown as NA.

JP1 - NA
JP2 - closed (CAN bus impedance)
JP3 - VDD jumper to J5 VLOGIC for HI-3200 daughter card.
JP4 - NA
JP5 - closed (CAN bus impedance)
JP7 - NA.

Mode Selection

The 8 examples to choose from when operating the HI-3200 Evaluation board are those identified in the HI-3200 data sheet (DS3200).

Mode2	Mode1	Mode0	Evaluation Examples
0	0	0	(1) ARINC 429 Data reception using on-chip RAM
0	0	1	(2) ARINC 429 Data reception using on-chip filters and FIFOs
0	1	0	(3) ARINC 429 Data transmission directly from CPU
0	1	1	(4) ARINC 429 Data transmission using on-chip schedulers
1	0	0	(5) ARINC 429 Data concentrator / Repeater
1	0	1	(6) ARINC 825 (CAN) bus monitor / Receiver
1	1	0	(7) ARINC 825 (CAN) Terminal / Data Manager
1	1	1	(8) ARINC 429 – ARINC 825 (CAN) Autonomous Bridge

(0=CLOSED, 1=OPEN)

OPT1 switch – not programmed
OPT2 switch - not programmed
Push Buttons SW1-SW4 - not programmed

Mode Descriptions

There are 8 valid example modes selectable by the Mode-0, Mode-1 and Mode-2 Dip switches on the general purpose board. Set the switches according to the desired mode, and power cycle the board or press the RESET button on the main board.

Mode- 0 (1) : ARINC 429 Data reception using on-chip RAM

The user must provide valid ARINC 429 data on any/all of the ARINC receivers (J2) to operate in this mode. The HI-3200 is configured to receive and store valid ARINC 429 words in RAM. The program will read the received data words using the SPI bus and display them on the console.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: X.X

Example 1: ARINC 429 Data reception using on-chip RAM

Master Control Register 0xF8

ARINC Receiver Control Registers
RX0 0x81
RX1 0x81
RX2 0x81
RX3 0x81
RX4 0x81
RX5 0x81
RX6 0x81
RX7 0x81

RX0 FF E6 FF 77
RX5 FF E6 FF 77
```

Mode- 1 (2): ARINC 429 Data reception using on-chip filters and FIFOs

This example demonstrates how received data (provided by the user) can be filtered and stored in FIFOs. This will allow the users to store up 32 received and valid ARINC 429 words.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: 0.1

Example 2: ARINC Data reception using on-chip filters and FIFOs

Master Control Register 0xF8

ARINC Receiver Control Registers
RX0 0x81
RX1 0x81
RX2 0x81
RX3 0x81
RX4 0x81
RX5 0x81
RX6 0x81
RX7 0x81

RX0 68 22 1F 7F
RX0 FF E6 FF 77
RX5 68 22 1F 7F
RX5 FF E6 FF 77
```

Mode- 2 (3): ARINC 429 Data transmission directly from CPU

This example demonstrates how transmitted words can be sent immediately using SPI op codes. All 4 transmitters are looping incremental data written each time by specific op codes. The ARINC 429 words can be viewed on J1.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: X.X

Example 3: ARINC 429 Data transmission directly from CPU

Master Control Register 0xF8

ARINC Receiver Control Registers
RX0 0x81
RX1 0x81
RX2 0x81
RX3 0x81
RX4 0x81
RX5 0x81
RX6 0x81
RX7 0x81
```

Mode- 3 (4): ARINC 429 Data transmission using on-chip schedulers

The HI-3200 Transmitters are pre-loaded with words in their respective descriptor tables. These are loaded after RESET. When RUN=1 data is transmitted and repeated based on each Transmitter's Repetition Rate register. TX0 and TX1 are transmitting high speed data. TX2 and TX3 are transmitting low speed data.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: 0.1

Example 4: ARINC 429 Data transmission using on-chip schedulers

Master Control Register 0xF8

ARINC Receiver Control Registers
RX0 0x81
RX1 0x81
RX2 0x81
RX3 0x81
RX4 0x81
RX5 0x81
RX6 0x81
RX7 0x81

ARINC Transmitter Control Registers
TX0 0x80
TX1 0x80
TX2 0xC0
TX3 0xC0
```

Mode- 4 (5): ARINC 429 Data concentrator / Repeater

The HI-3200 Transmitters are pre-loaded with words in their respective descriptor tables. These are loaded after RESET. When RUN=1, TX0 begins transmitting one immediate ARINC word from its descriptor table at a rate defined by the repetition rate register. By connecting TX0 to any receiver, conditional statements will be met in descriptor tables for TX0-TX4 and subsequent data will be transmitted on all 4 channels. The ARINC 429 receive filters are set to accept all data.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: X.X

Example 5: ARINC Data Concentrator / Repeater

Master Control Register 0xF8

ARINC Receiver Control Registers
RX0 0x81
RX1 0x81
RX2 0x81
RX3 0x81
RX4 0x81
RX5 0x81
RX6 0x81
RX7 0x81

ARINC Transmitter Control Registers
TX0 0x80
TX1 0x80
TX2 0x80
TX3 0x80
```

Mode- 5 (6): ARINC 825 (CAN) bus monitor / receiver

The HI-3200 CAN interface is initialized when RUN = 1. After RESET the CAN filter is set to receive all frames. When MINT = 1 the received CAN frame is output to the console. In order to operate in this mode the evaluation board must be connected to a valid CAN bus with a transmitting terminal.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: X.X

Example 6: ARINC 825 (CAN) bus Monitor / Receiver

Master Control Register 0xF8

CAN BUS bit timing Register 0 0x40
CAN BUS bit timing Register 1 0x27

3F DE 46 47 20 00 00 08 00 00 CF 76 00 00 00 00
3F E0 6B 47 20 00 00 08 00 00 CF 9A 00 00 00 00
3F E1 8C 47 20 00 00 08 00 00 CF AD 00 00 00 00
```

Mode- 6 (7): ARINC 825 (CAN) terminal / data manager

The HI-3200 CAN interface is initialized when RUN = 1. After RESET the CAN descriptor table is loaded with several types of CAN words. When RUN = 1 CAN frames are transmitted at a rate defined by the Repetition Rate register. In order to operate in this mode the evaluation board must be connected to a valid CAN bus.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: X.X

Example 7: ARINC 825 (CAN) Terminal / Data Manager

Master Control Register 0xF8

CAN BUS bit timing Register 0 0x40
CAN BUS bit timing Register 1 0x27
CAN transmit control Register 0x80
```

Mode- 7 (8): ARINC 429 Data concentrator / Repeater

This example uses the pre-programmed EEPROM to load the registers, schedulers, filters and tables of the HI-3200. After RESET the HI-3200 is loaded in its Mode 1 to auto-initialize from the EEPROM. When RUN=1, TX0 will transmit an immediate message with LABEL=0x00. This transmitter **MUST** be connected to any receiver on J2. When this ARINC word is received by the HI-3200 receiver(s), conditional statement s will be met in the CAN scheduler and CAN frames will be transmitted. The CAN bus must be connected to a valid CAN transceiver that will receive these frames and transmit new ones in return. The external CAN transceiver must return messages where ID28 to ID21 equals 0x04, 0x0A, 0x21 or 0xB1. Once the HI-3200 CAN interface receives frames with all or any of those IDs, conditions will be met in all 4 ARINC 429 transmitters and they will transmit their valid words. All or any other of the transmitters on J1 can be connected to any/all of the receivers on J2. If all these conditions and connections are met, this data bridge will operate indefinitely.

The output on the console will be similar to:

```
Holt HI-3200 Demonstration Software Revision: X.X

Example 8: ARINC 429 - ARINC 825 (CAN) Autonomous Bridge

Master Control Register 0xF8

ARINC Receiver Control Registers
RX0 0x81
RX1 0x81
RX2 0x81
RX3 0x81
RX4 0x81
RX5 0x81
RX6 0x81
RX7 0x81

ARINC Transmitter Control Registers
```

```
TX0 0x80
TX1 0x80
TX2 0x80
TX3 0x80

CAN BUS bit timing Register 0 0x40
CAN BUS bit timing Register 1 0x27
CAN transmit control Register 0x80
```

HI-3200 Daughter Card standalone use:

To use the Daughter Card in standalone mode without connection to the Holt General Purpose SPI main board a 16 pin connector J3 is provided with most of the signals needed to connect to an external MCU. Connectors J5 and J6 can provide some of the signals not preset on J3.

HI-3200 demo CodeWarrior™ Software Project

The software project is built with Freescale's CodeWarrior version 5.9.0 using the free limited 32K version. The main functions are in 3200eval.c. The software project "HI-3200 Demo" will normally be distributed in a zip file on a CD-ROM with the same name. **To develop, debug and download this software into the board a debug cable is necessary. It is not provided in this kit.** To purchase this cable, go to the PE Micro website or purchase it from Digi-Key.

Project Files

Source Files

3200eval.C	Main code
Uart.c	Low-level UART drivers
datapage.c	Freescale™ IDE support file

Include Files

HI3200eval.h	HI-3200 header
Uart.h	
Common.h	Common defines for the project
Derivative.h	Freescale™ IDE support file
Mc9s12xdt512.h	Freescale™ IDE target part support file

CodeWarrior™ and Software Project Setup:

1. Download and install the CodeWarrior™ IDE from the Freescale website. The download links are provided below.
2. Unzip the HI-3200 zip file into the directory you plan to use for your project.
3. Navigate to the HI-3200 project folder and double click the HI-3200 Demo.mcp project file to launch this project with CodeWarrior. The IDE should open with the project files on the left side of the window.
4. Click Make from the Project menu to rebuild the project. The project should build without errors. You may receive a dead assignment warning if for example some defines are set to a zero value.
5. Install the PE Micro USB Multilink Interface cable per the instructions.
6. Plug the USB Multilink 6-pin debug cable into the J9 debug connector and power up the board with 3.3V.
7. Download the program by clicking Debug from the Project menu. The first time the program is downloaded the debugger will need to be configured for the USB Multilink cable. After downloading is complete, the debugger window should be displayed with the first line in main.c highlighted. Press the green arrow button to run the program. Since the program has been loaded, you can power down the board and re-power the board and the program should run automatically without the debugger.

Freescale™ MC9S12XDT512xxx Development Tools

The Freescale™ microcontroller data sheet and other documentation can be found at this link:

http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=S12XD&tid=16bhp

If these links become out of date go to: http://www.freescale.com/

and search for information on “S12XD: 16-Bit Automotive Microcontroller”.

A Free 32K limited version of the CodeWarrior™ IDE from Freescale™ is available:

http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=CW-HCS12X&fsrch=1

The US Multilink debugger cable used for this project is:

http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=USBMULTILINKBDM&parentCode=S12XD&fpsp=1

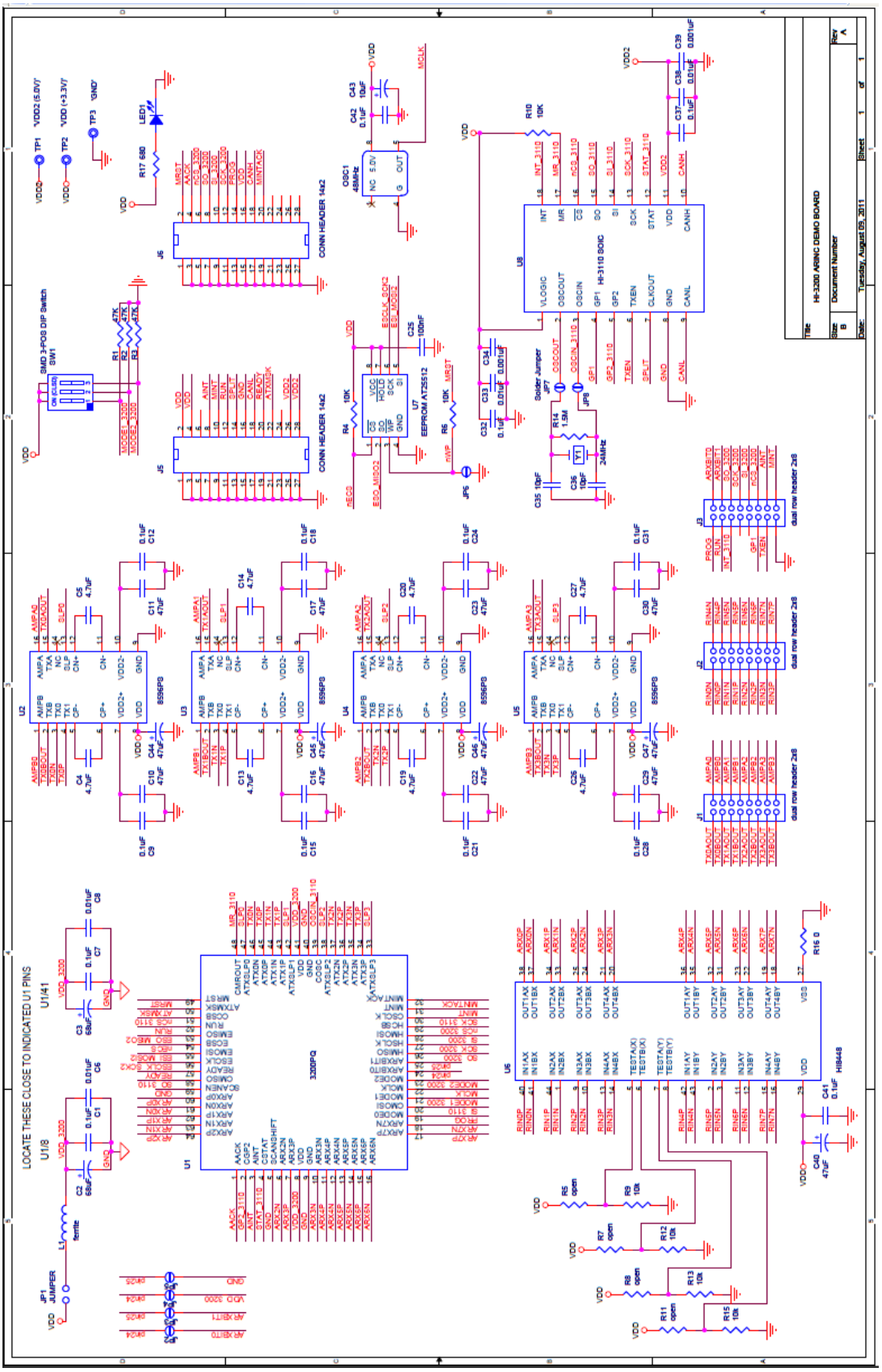
http://search.digikey.com/scripts/DkSearch/dksus.dll?Detail&name=USBMULTILINKBDME-ND

References:

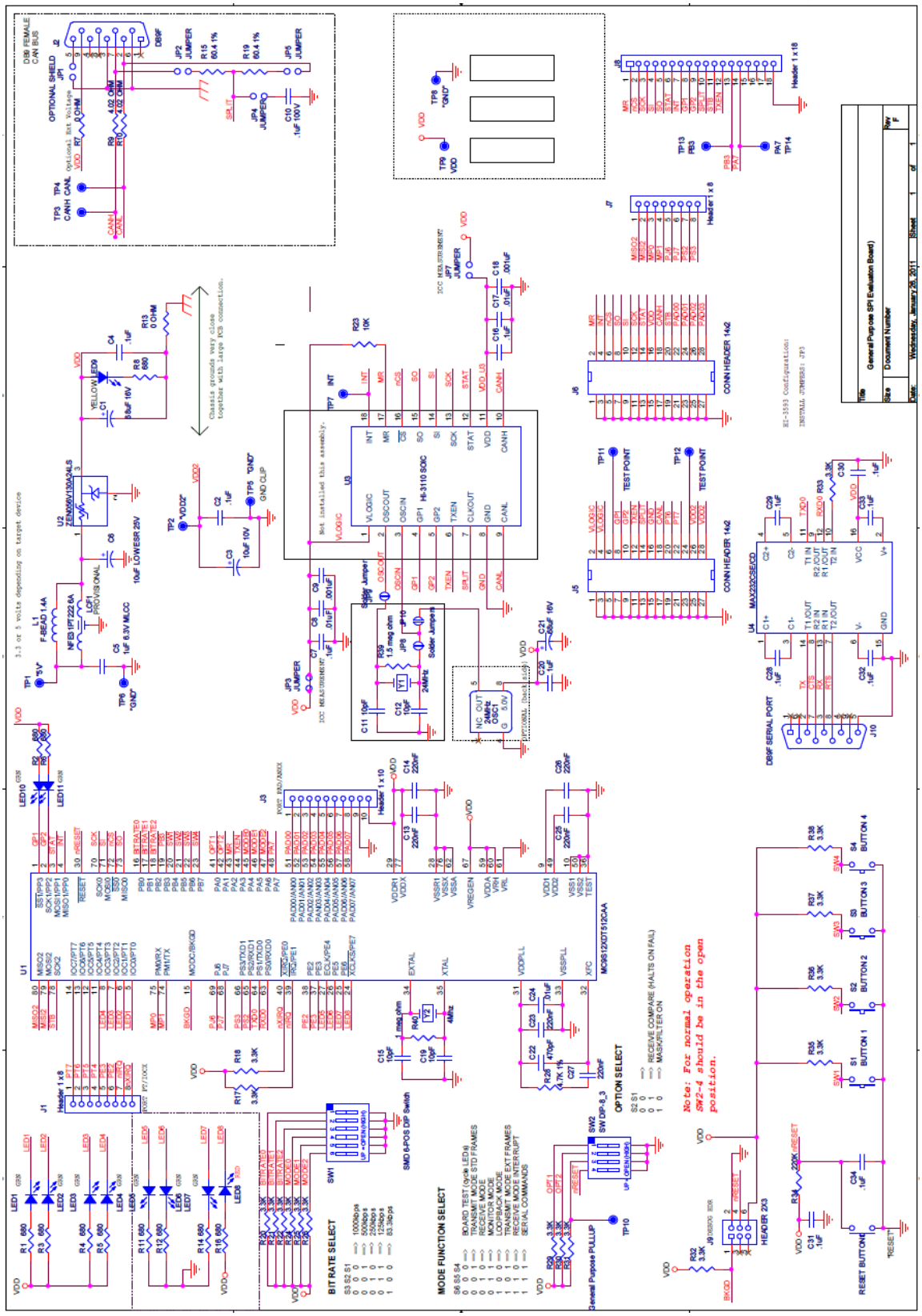
http://www.holtic.com/

BILL OF MATERIALS

HI-3200 ARINC DEMO BOARD Revised: August 9, 2011					
Item	Qty	Description	Reference	DigiKey	Mfr P/N
1	14	Capacitor, Ceramic 0.1uF 10% 100V X7R 0805	C1,C7,C9,C12,C15,C18,C21, C24,C28,C31,C32,C37,C41,C42	399-5333-1-ND	Kemet C0805X104K1RACTU
2	2	Capacitor 68uF 10% 6.3V Tantalum SMD EIA 6032-28	C2,C3	495-1507-1-ND	Kemet B45197A1686K309
3	8	CAP CER 4.7UF 10V X7R 0805	C4,C5,C13,C14,C19,C20,C26, C27	587-1442-1-ND	Taiyo Yuden - LMK212B7475KG-T
4	4	Cap Ceramic 0.01uF 20% 50V 7XR 0805	C6,C8,C33,C38	399-1160-1-ND	Kemet C0805C103M5RACTU
5	9	CAP CER 47UF 16V X5R 1210	C10,C11,C16,C17,C22,C23,C29, C30, C40	587-1436-1-ND	alternate 490-5312-1-ND
6	4	Cap Cer 47uF, 6.3V, X5R 0805	C44,C45,C46,C47	587-1779-1-ND	Taiyo Yuden - JMK212BJ476MG-T
7	1	CAP .10UF 50V CERAMIC Z5U 0805	C25	399-1176-1-ND	KEMET C0805C104M5UACTU
8	1	Capacitor, Ceramic 0.001uF 20% 50V 7XR 0805	C34,C39	399-1146-1-ND	Kemet C0805C102M5RACTU
9	2	Capacitor, Ceramic 10pF 5% NPO 50V 1206	C35,C36	311-1150-1-ND	YaegoCC1206JRNP09BN100
10	1	CAP TANTALUM 10UF 6.3V 20% SMD 1206	C43	499-2181-1-ND	KEMET B45196H1106M109
11	1	JUMPER - header, male 1x2 0.1"pitch	JP1		
12	7	Solder Jumper	JP2,JP3,JP4,JP5,JP6,JP7,JP8		
13	3	male dual row header 2x8 0.1" pitch	J1,J2,J3	s2012E-08-ND	Sullins - PEC08DAAN
14	2	male/female HEADER 14x2 0.1" pitch	J5,J6	SAM1196-14-ND	Samtec SSQ-114-03-G-D
15	1	ferrite - FERRITE CHIP 220 OHM 1400MA 0603	L1	490-5221-1-ND	Murata - BLM18PG221SN1D
16	1	LED RED 0805 SMD	LED1	160-1178-1-ND	Lite-On LTST-C170EKT
17	1	48MHz surface mount	OSC1	CSX-750PDCCT-ND	Citizen - CSX750P1P-UT
18	3	RES 47K OHM 1/8W 5% 0805 SMD	R1,R2,R3	311-47KARCT-ND	Yageo - RC0805JR-0747KL
19	7	RES 10K OHM 1/8W 5% 0805 SMD	R4,R6,R9,R10,R12,R13,R15	311-10KARCT-ND	Yageo - RC0805JR-0710KL
20	4	open	R5,R7,R8,R11		
21	1	RES 1.5M OHM 1/8W 5% 0805 SMD	R14	P1.5MACT-ND	Panasonic ECG ERJ-6GEYJ155V
22	1	RES 0.0 OHM 1/8W 5% 0805 SMD	R16	311-0.0ARCT-ND	YAGEO RC0805JR-070RL
23	1	RES 680OHM 1/8W 5% 0805 SMD	R17	311-680ARCT-ND	Yageo - RC0805JR-07680RL
24	1	SWITCH TAPE SEAL 3 POS SMD	SW1	CT2193LPST-ND	CTS 219-3LPST
25	1	TEST POINT RED, 0.063" (1.600mm)	TP1	5010K-ND	KEYSTONE 5010
26	1	TEST POINT RED, 0.063" (1.600mm) Hole Diameter	TP2	5010K-ND	KEYSTONE 5010
27	1	TEST POINT BLK, 0.063" (1.600mm) Hole Diameter	TP3	5011K-ND	KEYSTONE 5011
28	1	HI-3200PQ 64L PQFP	U1	Holt IC	
29	4	HI-8596PS 16L SOIC	U2,U3,U4,U5	Holt IC	
30	1	HI-8448PQ 44L PQFP	U6	Holt IC	
31	1	IC, Serial EEPROM 512Kbit 20MHz SPI 8-SOIC, Microchip	U7	25LC512T-I/SNCT-ND	Microchip 25LC512T-I/SN
32	1	HI-3110PS 18L SOIC	U8	Holt IC	
33	1	Crystal 24.00MHz, SMD, 50ppm 20pF load cap	Y1	631-1020-1-ND	FOXSDLF/240F-20



Bill of Material	General Purpose SPI evalutation board			Revised: 2/11/2011
Item	*Qty*	*Description*	*Reference*	*DigiKey*	*Mfr P/N*
1	1	PCB, Bare, Evaluation Board	N/A	--------	
1					
2	1	RS-232 Serial Cable		AE1379-ND	AK131-2-R
3	4	Capacitor, Ceramic 10pF 5% NPO 50V 1206	C11,C12,C15,C19	311-1150-1-ND	YaegoCC1206JRNP09BN100
4	1	Capacitor, Ceramic 470pF 10% NPO 50V 1206	C22	311-1167-1-ND	Yaego CC1206KRX7R9BB471
5	6	Capacitor, Ceramic 220nF 10% 50V X7R 0805	C13,C14,C23,C25,C26, C27	399-3491-1-ND	Kemet C0805C224K5RACTU
6	2	Capacitor, Ceramic 0.001uF 20% 50V 7XR 0805	C9,C18	399-1146-1-ND	Kemet C0805C102M5RACTU
7	3	Capacitor, Ceramic 0.01uF 20% 50V 7XR 0805	C8,C17,C24	399-1160-1-ND	Kemet C0805C103M5RACTU
8	13	Capacitor, Ceramic 0.1uF 10% 100V X7R 0805	C2,C4,C7,C10,C16,C20, C28,C29,C30,C31,C32, C33,C34	399-5333-1-ND	Kemet C0805X104K1RACTU
9	1	Capacitor 10uF 10% 10V 1206	C3	399-3684-1-ND	Kemet T491A106K010AT. Alternate: 718-1121-1-ND
10	2	Capacitor 68uF ,20%, 16V Tantalum SMD Kemet	C1,C21	495-2254-1-ND	Kemet b45196h3686m409
11	2	Connector DB9F, Rt-Angle PCB Short Body	J2,J10	A35109-ND	NorComp 182-009-213R161
12	1	Resistor, 220k 5%	R34	P220KACT-ND	Panasonic ERJ-6GEYJ224V
13	2	Header, Male 1x8, 0.1" Pitch	J1,J7	S2012-18-ND **DO NOT STUFF**	Sullins
14	2	Header, Male 2X14, 0.1" Pitch	J5,J6	S1012-12-ND **DO NOT STUFF**	Sullins
15	0	Header, Male 1x18, 0.1" Pitch	J8	**DO NOT STUFF**	Sullins
16	1	Header, Male 0.1" Right Angle 2 x 3	J9	S2312E-ND	Sullins
17	9	LED Green 0805	LED1,LED2,LED3,LED4 ,LED5,LED6,LED7,LED 10,LED11	160-1179-1-ND	LiteOn LTST-C170GKT
18	1	LED Yellow 0805	LED9	160-1175-1-ND	LiteOn LTST-C170YKT
19	1	LED Red 0805	LED8	160-1176-1-ND	LiteOn LTST-C170CKT
20	1	Resistor , 1 meg 5% 0805	R40	P1.0MACT-ND	Panasonic ECG ERJ-6GEYJ105V
21	17	Resistor, 3.3K Ohm 5% 1/8W 0805	R17,R18,R20,R21,R22, R24,R25,R26,R29,R30, R31,R32,R33,R35,R36, R37,R38	311-3.3KARCT-ND	Alternate: 541-3.3KACT-ND
22	11	Resistor, 680 5% 1/8W 0805	R1,R2,R3,R4,R5,R6,R8, R11,R12,R14,R16	311-680ARCT-ND	Any
23	2	Resistor, 4.02 OHM 1% 1/8W 0805	R9,R10	541-4.02CCT-ND	CRCW08054R02FNEA OR OTHER
24	2	Resistor, 60.4 1% .5W	R15,R19	P60.4AACT-ND	Panasonic ERJ-14NF60R4U
25	2	Resistor, 0 ohm 5% 1/8W 0805	R7,R13	311-0.0ACT-ND	Any
26	1	Resistor, 1.5 meg 5%	R39	P1.5MACT-ND	Panasonic ECG ERJ-6GEYJ155V
27	1	Resistor, 4.7k 1% 1/10 W SMD	R28	RMCF1/104.7KFRCT-ND	Stackpole Electronics or other
28	1	DIP Switch 4-Pos Slide SMD	SW2	CT2194LPST-ND	CTS 219-4LPST
29	1	DIP Switch 6-Pos Slide SMD	SW1	CT2196LPST-ND	CTS 2196LPST. Alternate: CKN6121 ND
30	5	Push Button Switch	S1,S2,S3,S4,RESET BUTTON	P12948SCT-ND	Panasonic EVQ-Q2P02W
31		TVS 5.6V Diode	U2	Mouser: 650-ZEN056V130A24LS	Tyco ZEN056V130A24LS
32	2	Test Point, Red Insulator, 0.062" hole	TP1, TP9	5010K-ND	Keystone 5010
33	7	Test Point, Black Insulator, 0.062" hole	TP3,TP4,TP5,TP6,TP7, TP8,TP10	5011K-KD	Keystone 5011
34	1	IC, MC9S12XDT512CAA 80 QFP 16-Bit MCU, 512K Flash 0-70C	U1	Digikey: MC9S12XDT512CAA-ND	
35					
42	1	IC, MAX3232CSE Narrow 16-SOIC	U4	MAX232CSE+-ND	Texas Inst MAX3232CDR Maxim MAX3232CSE+-ND
43					
44					
45	1	Crystal 24.00MHz, SMD, 50ppm 20pF load cap	Y1	631-1020-1-ND	FOXSDLF/240F-20
46	1	Crystal 4.00MHz, SMD, 50ppm 20pF	Y2	XC564CT-ND	DIGIKEY
47	1	Crystal 24MHz,OSC MODULE - **OPTIONAL DO NOT INSTALL**	OSC1	DO NOT STUFF - ESCP85-AN-ND 24MHz	MFG: ECS ESCP85-AN-ND
47	4	Stand-off, #4-40 Female Thread, 1" long	-----	3482K-ND	
48	4	Machine Screw, #4-40 x 1/4"	-----	H343-ND	
49	4	Lock Washer, Int.Tooth #4-40	-----	H729-ND	
50	1	Ferrite Bead	L1	490-5221-1-ND	
51	1	1uF 6.3V MLCC	C5	490-4354-1-ND	Murata: LLL219R70J105MA01 (do not sub)
52	1	4.7uF 10% 6.3V Low ESL	C6	587-1237-1-ND	Taiyo Yuden JWK212C6475KD-ND
53	1	LC Filter 2200pF 1206	LCF1	490-2547-1-ND	Murata NFE31PT222
54	4	3M Bumpon		SJ5746-0-ND	3M: SJ61A1


Note: For normal operation
SW2-4 should be in the open
position.
BIT RATE SELECT
MODE FUNCTION SELECT
OPTION SELECT
BOARD TEST (cycle LEDs)
TRANSMIT MODE STD FRAMES
RECEIVE MODE
MONITOR MODE
LOOPBACK MODE
TRANSMIT MODE EXT FRAMES
RECEIVE MODE INTERRUPT
SERIAL COMMANDS
RESET BUTTON
HEADER 2X3
BUTTON 1
BUTTON 2
BUTTON 3
BUTTON 4
DB9F SERIAL PORT
CONN HEADER 14x2
TEST POINT
SMD 6-POS DIP Switch
SW DIP-8_3
Header 1 x 8
Header 1 x 10
Header 1 x 16
Title
General Purpose SPI Evaluation Board)
Document Number
Wednesday, January 26, 2011

REVISION HISTORY

P/N	Rev	Date	Description of Change
AN-165	NEW	08/12/11	Initial Release