



# DS26503DK T1/E1/J1 BITS Element Design Kit

[www.maxim-ic.com](http://www.maxim-ic.com)

## GENERAL DESCRIPTION

The DS26503DK is an easy-to-use evaluation board for the DS26503 T1/E1/J1 BITS element. The DS26503DK is intended to be used as a stand-alone design kit. The board is complete with a DS26503 BITS element, transformers, termination resistors, FPGA-based configuration switches, and network connectors. Dallas' ChipView software gives point-and-click access to configuration and status registers from a Windows®-based PC. On-board LEDs indicate receive loss-of-signal and interrupt status as well as multiple clock and signal routing configurations.

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## DEMO KIT CONTENTS

DS26503DK Design Kit  
CD\_ROM Including:

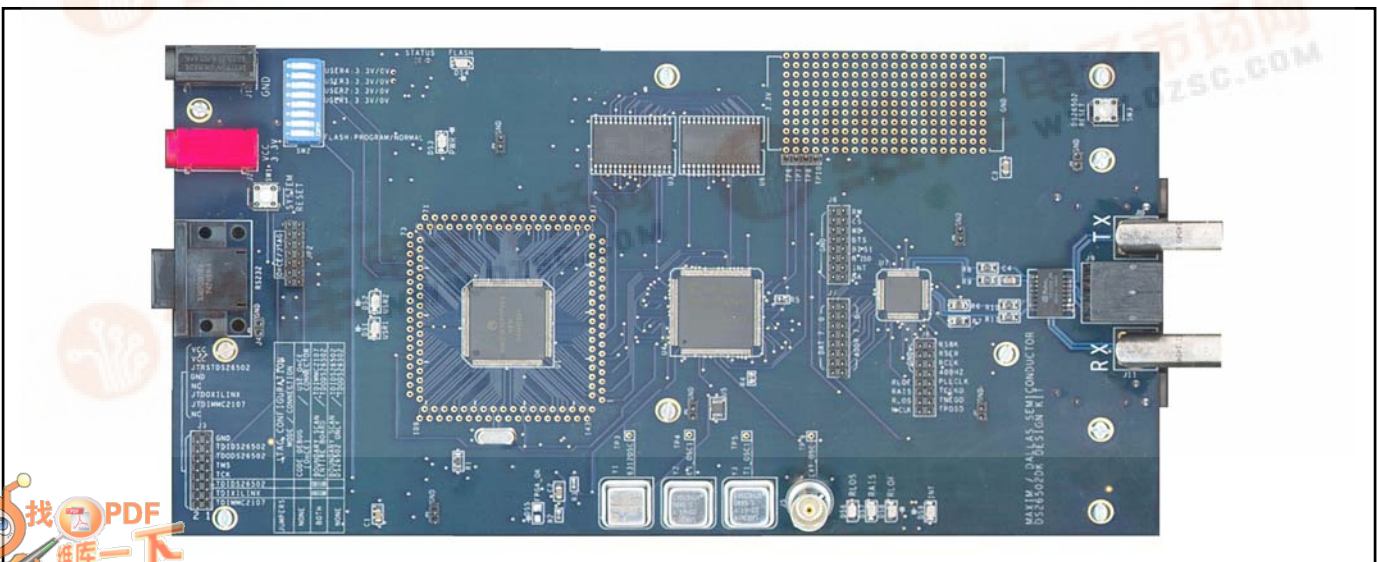
- ChipView Software
- DS26503DK Data Sheet
- DS26503 Data Sheet
- DS26503 Errata Sheet (if applicable)

## FEATURES

- **Expedites New Designs by Eliminating First-Pass Prototyping**
- **Demonstrates Key Functions of DS26503 BITS Element**
- **Includes DS26503 BITS Element, Transformers, BNC, and RJ48 Network Connectors and Termination Passives**
- **BNC Connections for 75Ω E1**
- **Bantam and RJ48 Connectors for 120Ω E1 and 100Ω T1**
- **Interface Directly to Windows-Based Computers**
- **ChipView Software Provides Point-and-Click Access to the DS26503 Register Set**
- **Software-Controlled (Register Mapped) Configuration Switches to Facilitate Clock and Signal Routing**
- **All Equipment-Side Framer Pins are Easily Accessible for External Data Source/Sink**
- **LEDs for Loss-of-Signal and Interrupt Status as well as Indications for Multiple Clock and Signal Routing Configurations**
- **Easy-to-Read Silkscreen Labels Identify the Signals Associated with All Connectors, Jumpers, and LEDs**

## ORDERING INFORMATION

PART	DESCRIPTION
DS26503DK	Stand-Alone Design Kit for DS26503

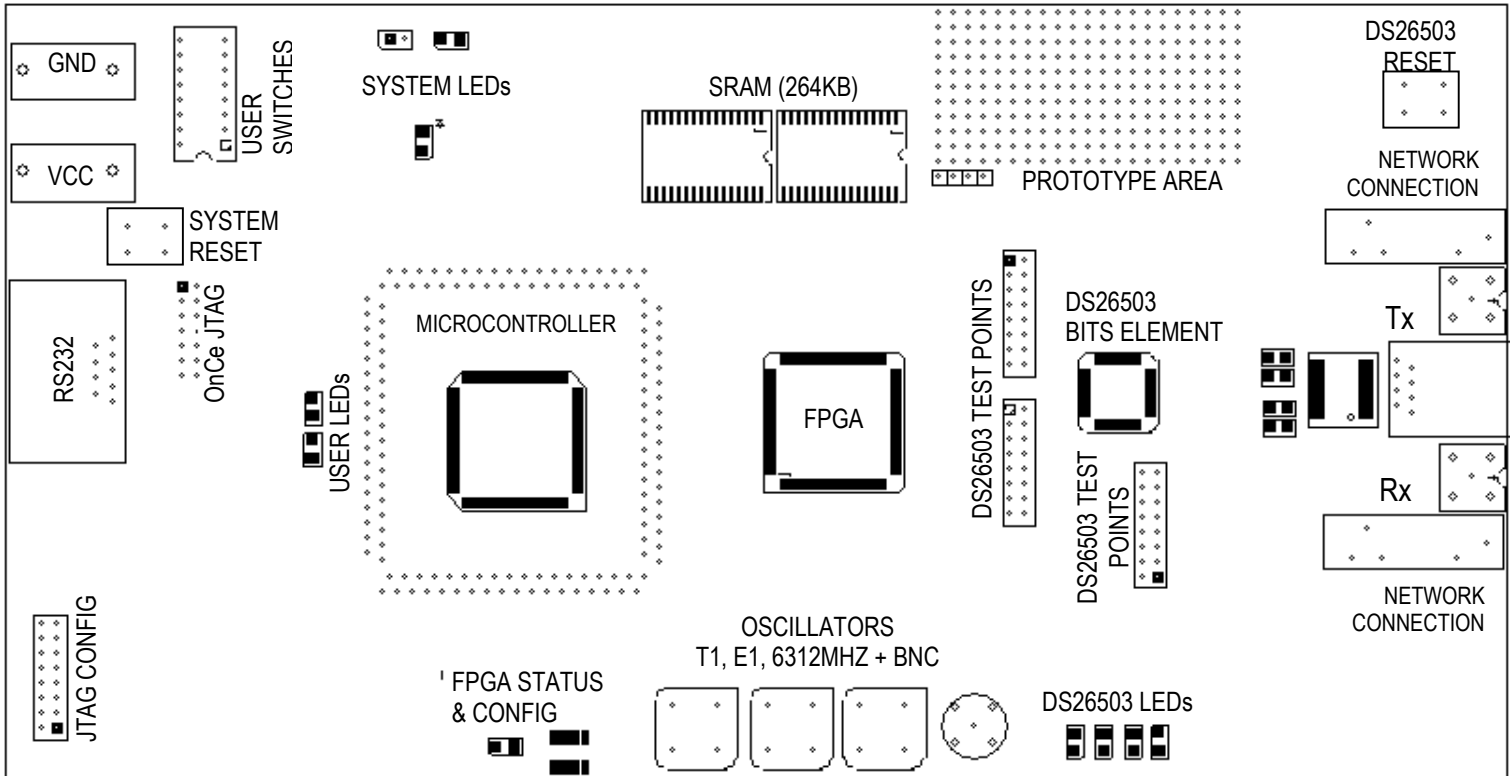


**COMPONENT LIST**

DESIGNATION	QTY	DESCRIPTION	SUPPLIER	PART
C1, C4, C23, C51, C53	5	10 $\mu$ F 20%, 10V ceramic capacitors (1206)	Panasonic	ECJ-3YB1A106M
C2–C3, C6–C9, C11, C12, C14, C15, C17, C18, C20, C21, C25–C30, C32, C33, C35, C36, C38, C45–C50, C52, C54, C55, C57–C60, C62, C63, C68	41	1 $\mu$ F 10%, 16V ceramic capacitors (1206)	Panasonic	ECJ-3YB1C105K
C5, C10, C22, C24, C31, C34, C37, C39–C41, C43, C65–C67, C69, C70	16	0.1 $\mu$ F 20%, 16V X7R ceramic capacitors (0603)	AVX	0603YC104MAT
C13, C19, C42, C44, C64	5	10 $\mu$ F 20%, 16V tantalum capacitors (B case)	Panasonic	ECS-T1CX106R
C16, C56, C61	3	68 $\mu$ F 20%, 16V tantalum capacitors (D case)	Panasonic	ECS-T1CD686R
D1	1	1A 50V general-purpose silicon diode	General Semiconductor	1N4001
DS1, DS2, DS6–DS9	6	Red LEDs, SMD	Panasonic	LN1251C
DS3	1	Green LED, SMD	Panasonic	LN1351C
DS4	1	Amber LED, SMD	Panasonic	LN1451C
DS5	1	Green LED, SMD (Not populated)	Panasonic	LN1351C
DS10	1	Red/green LED, 5mm right-angle PCMT	Digi-Key	350-1055-ND
J1	1	Socket, banana plug, horizontal, black	Mouser Electronics	164-6218
J2	1	Socket, banana plug, horizontal, red	Mouser Electronics	164-6219
J3, J6–J8	4	Terminal strip, 16-pin, dual row, vertical	Samtec	TSW-108-07-T-D
J4	1	DB9 right-angle, long case connector	AMP	747459-1
J5	1	75 $\Omega$ vertical 5-pin BNC connector	Cambridge	CP-BNCPC-004
J9	1	RJ48 8-pin, single-port connector	MOLEX	15-43-8588
J10, J11	2	BNC connectors, 75 $\Omega$ right-angle 5-pin	Kruvand	UCBJR220
J12, J13	2	Bantam jack, right-angle connectors	Switchcraft	RTT34B02
JP1, JP3–JP8	7	100-mil, 2-position jumper	labstock	
JP2	1	14-pin header, remove 'missing pin'	labstock	
L1	1	Inductor, 22.0 $\mu$ H 2-pin SMT 20%	Coiltronics	UP1B-220
NP1, NP2	2	10pF 5%, 50V tall case ceramic capacitors (1206) Do not populate	Phycomp	1206CG100J9B200
R1, R8–R11	5	0 $\Omega$ 5%, 1/8W resistors (1206)	Panasonic	ERJ-8GEYJ0R00V
R2, R13, R23, R27, R43, R47, R67–R70	10	330 $\Omega$ 5%, 1/16W resistors (0603)	Panasonic	ERJ-3GEYJ331V

DESIGNATION	QTY	DESCRIPTION	SUPPLIER	PART
R3, R18–R20, R22, R25, R26, R28–R31, R33–R42, R44–R46, R49, R50, R53, R56, R59, R61, R62, R65, R72	33	10k $\Omega$ 5%, 1/16W resistors (0603)	Panasonic	ERJ-3GEYJ103V
R4, R5, R48, R51, R54, R55, R57, R58	8	30 $\Omega$ 5%, 1/16W resistors (0603)	Panasonic	ERJ-3GEYJ300V
R6, R7	2	61.9 $\Omega$ 1%, 1/8W resistors (1206)	Panasonic	ERJ-8ENF61R9V
R12	1	51 $\Omega$ 5%, 1/16W resistor (0603)	Panasonic	ERJ-3GEYJ510V
R14–R17, R21, R24, R63, R64, R66, R71	10	1.0k $\Omega$ 5%, 1/16W resistors (0603)	Panasonic	ERJ-3GEYJ102V
R32	1	1.0k $\Omega$ 5%, 1/10W resistor (0805)	Panasonic	ERJ-6GEYJ102V
R52	1	51.1 $\Omega$ 1%, 1/10W resistor (0805)	Panasonic	ERJ-6ENF51R1V
R60	1	1.0M $\Omega$ 5%, 1/16W resistor (0603)	Panasonic	ERJ-3GEYJ105V
SW1, SW3	2	Switch MOM 4-pin single pole	Panasonic	EVQPAE04M
SW2	1	Switch 8-position, 16-pin DIP, low profile	AMP	435668-7
T1	1	XFMR 16P SMT	Pulse	TX1099
TP1, TP2	2	Test point, 1 plate thru-hole	NA	NA
TP3–TP10	8	Test point, 1 plated hole DO NOT STUFF	NA	NA
U1	1	32-bit microcontroller (lab stock)	Avnet	MMC2107CFCV33
U3, U6	2	SRAM 5V, 1Mb SO (in lab stock)	Cypress	CY62128V
U4	1	Xilinx Spartan 2.5V FPGA, 20mm x 20mm 144-pin TQFP	Xilinx	XC2S50-5TQ144C
U5	1	8-Pin $\mu$ MAX/SO 2.5V or Adj	Maxim	MAX1792EUA25
U7	1	64-pin LQFP T1/E1/J1 BITS element (0°C to +70°C)	Dallas Semiconductor	DS26503L
U8, U9, U13	3	High-speed inverter	Fairchild	NC7SZ86
U10	1	High-speed buffer	Fairchild	NC7SZ86
U11	1	Dual RS-232 transceivers with 3.3V/5V internal capacitors	Maxim	MAX3233E
U12	1	1Mb flash-based config mem	Xilinx	XCF01SV020C
U14	1	8-pin SO step-up DC-DC converter 0.5A limit	Maxim	MAX1675EUA
X1	1	Low-profile 8.0MHz crystal	PEI	EC1-8.000M
Y1	1	Oscillator, crystal clock, 3.3V, 6.312MHz	SaRonix	NTH069A3-6.312
Y2	1	Oscillator, crystal clock, 3.3V, 2.048MHz	SaRonix	NTH039A3-2.0480
Y3	1	Oscillator, crystal clock, 3.3V, 1.544MHz	SaRonix	NTH039A3-1.5440

## BOARD FLOORPLAN



## ERRATA

The design kit errata refer to two different PC board revisions: the DS26502DK01A0 and DS26502DK01B0. The PC board revision code is found on the bottom of the board in the lower right corner.

### **DS26502DK01A0 Circuit Boards**

- RCLK did not get connected to FPGA. A jumper wire was run from RCLK to TP10 to provide the connection.
- Silkscreen for J3.4 is incorrect. Silkscreen reads “JTDIMMC2107” and should read “JTDOMMC2107.”
- RJ45 connector J4 does not use the standard pin numbers for connection to the transformer (and subsequently to TTIP/TRING and RTIP/RRING). This connector has been left unpopulated to avoid confusion. The schematic has been updated and is correct.
- DC blocking capacitor C4 on TTIP too small. A 10 $\mu$ F capacitor is recommended; a 1 $\mu$ F capacitor was populated.

### **DS26502DK01B0 Circuit Boards**

- RJ45 connector J4 does not use the standard pin numbers for connection to the transformer (and subsequently to TTIP/TRING and RTIP/RRING). This connector has been left unpopulated to avoid confusion. The schematic has been updated and is correct.

## ADDITIONS

The following signals have been connected to test points via the FPGA:

- TP6 is driven with data present at the TS\_8K\_4 pin of the DS26503.
- TP7 is driven with the 400Hz signal mentioned in the TS\_8Ksrc register (page 15).
- TP8 is driven with the 8KHz signal mentioned in the TS\_8Ksrc register (page 15).

## BASIC OPERATION

This design kit relies upon several supporting files, which are available for downloading on our website at [www.maxim-ic.com/telecom](http://www.maxim-ic.com/telecom). See the DS26503DK QuickView data sheet for these files.

### Hardware Configuration

- Supply 3.3V to the banana-plug receptacles marked GND and VCC\_3.3V.
- DIP switches are unused and can be in either the ON or OFF position with exception for the Flash programming switch, which should be OFF.
- From the Programs menu, launch the host application named ChipView.exe. Run the ChipView application. If the default installation options were used, click the Start button on the Windows toolbar and select Programs → ChipView → ChipView.

### General

- Upon power-up the RLOS and RLOF LEDs (red) will be lit, the INT LED (red) will not be lit, and Status LED (DS10 red/green bicolor) will be green.

### Quick Setup (Register View)

- The PC will load ChipView offering a choice among DEMO MODE, REGISTER VIEW, and TERMINAL MODE. Select Register View.
- The program will then request a definition file. Select DS26503DC\_FPGA.def. Through the 'links' section, this will also load DS26503.def.
- The Register View Screen will appear, showing the register names, acronyms, and values for the DS26503.
- Predefined Register settings for several functions are available as initialization files.
  - ini files are loaded by selecting the menu File→Reg ini File→Load ini File.
  - Load the ini file "CompositeClock.ini."
  - Load the ini file "DS26502FPGA\_2048Clks.ini," which sets the DS26503 in Intel nonmultiplexed mode with MCLK driven at 2.048MHz.
  - After loading the ini files the following may be observed:
    - The RLOS and RLOF LEDs extinguishes upon external loopback.
    - The part begins operating in composite clock mode.

### Miscellaneous

- Clock frequencies and certain pin bias levels are provided by a register-mapped FPGA.
- The definition file for this FPGA is named DS26503DC\_FPGA.def. [Table 2](#) shows the FPGA register definitions. A drop-down menu on the top of the screen allows for switching between definition files.
- All files referenced above are available for download as described in the section marked "BASIC OPERATION."

## ADDRESS MAP

Device address space (DS26503 and FPGA) begins at 0x81000000.

All offsets given below are relative to the beginning of the device address space (shown above).

**Table 1. Device Address Map**

OFFSET	DEVICE	DESCRIPTION
0x0000 to 0x0030	FPGA	Board identification and clock/signal routing
0x8000 to 0x80ff	DS26503 T1/E1/J1 BITS element	DS26503 T1/E1/J1 BITS element

Registers in the FPGA can be easily modified using the ChipView host-based user interface software along with the definition file named “DS26503DC\_FPGA.def”.

## FPGA Register Map

**Table 2. FPGA Register Map**

OFFSET	REGISTER NAME	TYPE	DESCRIPTION
0x0000	BID	Read only	BOARD ID
0x0001	Unused	—	—
0x0002	XBIDH	Read only	HIGH NIBBLE EXTENDED BOARD ID
0x0003	XBIDM	Read only	MIDDLE NIBBLE EXTENDED BOARD ID
0x0004	XBIDL	Read only	LOW NIBBLE EXTENDED BOARD ID
0x0005	BREV	Read only	BOARD FAB REVISION
0x0006	AREV	Read only	BOARD ASSEMBLY REVISION
0x0007	PREV	Read only	PLD REVISION
0x0007	BUSMO	Read only	BUS MODE INFORMATION
0x09-0x10	Unused	—	—
0x0011	LEVEL1	Control	DS26503 pin settings (THZE, BTS–HBE, BIS1, BIS0)
0x0012	LEVEL2	Control	DS26503 pin settings (RMODE3, RMODE2, RMODE1, RMODE0)
0x0013	LEVEL3	Control	DS26503 pin settings (RSM, RITD)
0x0014	LEVEL4	Control	DS26503 pin settings (TSM, TITD)
0x0015	LEVEL5	Control	DS26503 pin settings (TCSS1, TCSS0)
0x0016	LEVEL6	Control	DS26503 pin settings (TMODE3, TMODE2, TMODE1, TMODE0)
0x0017	LEVEL7	Control	DS26503 pin settings (L2, L1, L0)
0x0018	LEVEL8	Control	DS26503 pin settings (TAIS, RLB)
0x0019	LEVEL9	Control	DS26503 pin settings (MPS1, MPS0)
0x001A	LEVEL10	Control	DS26503 pin settings (JAMUX, E1TS)
0x001B	Unused	—	—
0x001C	TSERsrc	Control	DS26503 TSER source selection
0x001D	MCLKsrc	Control	DS26503 MCLK source selection
0x001E	TCLK	Control	DS26503 TCLK source selection
0x001F	TS_8K	Control	DS26503 TS_8K source selection
0x0020	Unused	—	—
0x0021	Unused	—	—

## FPGA ID Registers

### BID: BOARD ID (Offset = 0x0000)

BID is read only with a value of 0xD.

### XBIDH: HIGH NIBBLE EXTENDED BOARD ID (Offset = 0x0002)

XBIDH is read only with a value of 0x0.

### XBIDM: MIDDLE NIBBLE EXTENDED BOARD ID (Offset = 0x0003)

XBIDM is read only with a value of 0x1.

### XBIDL: LOW NIBBLE EXTENDED BOARD ID (Offset = 0x0004)

XBIDL is read only with a value of 0x6.

### BREV: BOARD FAB REVISION (Offset = 0x0005).

BREV is read only and displays the current fab revision.

### AREV: BOARD ASSEMBLY REVISION (Offset = 0x0006)

AREV is read only and displays the current assembly revision.

### PREV: PLD REVISION (Offset = 0x0007)

PREV is read only and displays the current PLD firmware revision.

## FPGA Status Registers

Register Name: **BUSMO**

Register Description: **DS26503 Bus Mode**

Register Offset: **0x0011**

Bit #	7	6	5	4	3	2	1	0
Name	LevCPOL	LevCPHA	HW	SPI	INMUX	IMUX	MNMUX	MMUX
Default	—	—	—	—	—	—	—	—

The FPGA derives values in the BUSMO register from the levels present at the DS26503 pins.

**Bit 7: LevCPOL.** When set the DS26503 CPOL pin is high. Note: This pin is called A3/CPOL/L1 in parallel/serial/hardware modes.

**Bit 6: LevCPHA.** When set the DS26503 CPHA pin is high. Note: This pin is called A2/CPHA/L0 in parallel/serial/hardware modes.

**Bit 5: HW.** When set the DS26503 is in hardware mode.

**Bit 4: SPI.** When set the DS26503 is in SPI (3-wire) mode.

**Bit 3: INMUX.** When set the DS26503 is in Intel nonmultiplexed mode.

**Bit 2: IMUX.** When set the DS26503 is in Intel multiplexed mode.

**Bit 1: MNMUX.** When set the DS26503 is in Motorola nonmultiplexed mode.

**Bit 0: MMUX.** When set the DS26503 is in Motorola multiplexed mode.

## FPGA Control Registers

The FPGA register set consists of two types of registers: level setting and clock multiplexing. There are 10 registers for tri-state and level-control setting when in hardware mode. The level-setting registers are only valid when the DS26503 is in hardware mode (BIS1:0 = 11). When in nonhardware mode, the FPGA pins affected by the level registers are automatically either tri-stated, or assume an alternate function (e.g., they function as address databus pins or SPI pins). Exceptions are given with the register descriptions.

Register Name: **LEVEL1**

Register Description: **DS26503 Pin Settings (THZE, BTS, BIS1, BIS0)**

Register Offset: **0x0011**

Bit #	7	6	5	4	3	2	1	0
Name	THZEtri	THZE_Lev	BTStri	BTS_Lev	BIS1tri	BIS1_Lev	BIS0tri	BIS0_Lev
Default	0	0	0	0	0	0	0	1

**Note:** This register is only valid in ALL modes (many of the level registers are only valid in hardware mode).

### Bits 7 and 6: DS26503 THZE Tri-State and Level (THZEtri and THZE\_Lev)

00 = FPGA drives THZE with 3.3V

01 = FPGA drives THZE with 0V

1x = FPGA tri-states THZE pin

### Bit 5 and 4: DS26503 BTS Tri-State and Level (BTStri and BTS\_Lev)

00 = FPGA drives BTS with 3.3V

01 = FPGA drives BTS with 0.0V

1x = FPGA tri-states BTS pin

### Bits 3 and 2: DS26503 BIS1 Tri-State and Level (BIS1tri and BIS1\_Lev)

00 = FPGA drives BIS1 with 3.3V

01 = FPGA drives BIS1 with 0.0V

1x = FPGA tri-states BIS1 pin

### Bits 1 and 0: DS26503 BIS0 Tri-State and Level (BIS0tri and BIS0\_Lev)

00 = FPGA drives BIS0 with 3.3V

01 = FPGA drives BIS0 with 0.0V

1x = FPGA tri-states BIS0 pin



Register Name: **LEVEL2**

Register Description: **DS26503 Pin Settings (RMODE3, RMODE2, RMODE1, RMODE0)**

Register Offset: **0x0012**

Bit #	7	6	5	4	3	2	1	0
Name	RMODE3 tri	RMODE3 _Lev	RMODE2 tri	RMODE2 _Lev	RMODE1 tri	RMODE1 _Lev	RMODE0 tri	RMODE0 _Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode (BIS[1:0] = 11), and is ignored for other modes.

**Bits 7 and 6: DS26503 RMODE3 Tri-State and Level (RMODE3tri and RMODE3\_Lev)**

00 = FPGA drives RMODE3 with 3.3V

01 = FPGA drives RMODE3 with 0.0V

1x = FPGA tri-states RMODE3 pin

**Bits 5 and 4: DS26503 RMODE2 Tri-State and Level (RMODE2tri and RMODE2\_Lev)**

00 = FPGA drives RMODE2 with 3.3V

01 = FPGA drives RMODE2 with 0.0V

1x = FPGA tri-states RMODE2 pin

**Bits 3 and 2: DS26503 RMODE1 Tri-State and Level (RMODE1tri and RMODE1\_Lev)**

00 = FPGA drives with RMODE1 3.3V

01 = FPGA drives with RMODE1 0.0V

1x = FPGA tri-states RMODE1 pin

**Bits 1 and 0: DS26503 RMODE0 Tri-State and Level (RMODE0tri and RMODE0\_Lev)**

00 = FPGA drives RMODE0 with 3.3V

01 = FPGA drives RMODE0 with 0.0V

1x = FPGA tri-states RMODE0 pin

Register Name: **LEVEL3**

Register Description: **DS26503 Pin Settings (RSM, RITD)**

Register Offset: **0x0013**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	RSMtri	RSM_Lev	—	—	RITDtri	RITD_Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode (BIS[1:0] = 11), and is ignored for other modes.

**Bits 5 and 4: DS26503 RSM Tri-State and Level (RSMtri and RSM\_Lev)**

00 = FPGA drives RSM with 3.3V

01 = FPGA drives RSM with 0.0V

1x = FPGA tri-states RSM pin

**Bits 1 and 0: DS26503 RITD Tri-State and Level (RITDtri and RITD\_Lev)**

00 = FPGA drives RITD with 3.3V

01 = FPGA drives RITD with 0.0V

1x = FPGA Tristates RITD pin

Register Name: **LEVEL4**

Register Description: **DS26503 Pin Settings (TSM, TITD)**

Register Offset: **0x0014**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	TSMtri	TSM_Lev	—	—	TITDtri	TITD_Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode ( $BIS[1:0] = 11$ ), and is ignored for other modes.

**Bits 5 and 4: DS26503 TSM Tri-State and Level (TSMtri and TSM\_Lev)**

00 = FPGA drives TSM with 3.3V

01 = FPGA drives TSM with 0.0V

1x = FPGA tri-states TSM pin

**Bits 1 and 0: DS26503 TITD Tri-State and Level (TITDtri and TITD\_Lev)**

00 = FPGA drives TITD with 3.3V

01 = FPGA drives TITD with 0.0V

1x = FPGA tri-states TITD pin

Register Name: **LEVEL5**

Register Description: **DS26503 Pin Settings (TCSS1, TCSS0)**

Register Offset: **0x0015**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	TCSS1tri	TCSS1_Lev	—	—	TCSS0tri	TCSS0_Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode ( $BIS[1:0] = 11$ ), and is ignored for other modes.

**Bits 5 and 4: DS26503 TCSS1 Tri-State and Level (TCSS1tri and TCSS1\_Lev)**

00 = FPGA drives TCSS1 with 3.3V

01 = FPGA drives TCSS1 with 0.0V

1x = FPGA tri-states TCSS1 pin

**Bits 1 and 0: DS26503 TCSS0 Tri-State and Level (TCSS0tri and TCSS0\_Lev)**

00 = FPGA drives TCSS0 with 3.3V

01 = FPGA drives TCSS0 with 0.0V

1x = FPGA tri-states TCSS0 pin

Register Name: **LEVEL6**

Register Description: **DS26503 Pin Settings (TMODE3, TMODE2, TMODE1, TMODE0)**

Register Offset: **0x0016**

Bit #	7	6	5	4	3	2	1	0
Name	TMODE3 tri	TMODE3 _Lev	TMODE2 tri	TMODE2 _Lev	TMODE1 tri	TMODE1 _Lev	TMODE0 tri	TMODE0 _Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode (BIS[1:0] = 11), and is ignored for other modes.

**Bits 7 and 6: DS26503 TMODE3 Tri-State and Level (TMODE3tri and TMODE3\_Lev)**

00 = FPGA drives TMODE3 with 3.3V

01 = FPGA drives TMODE3 with 0.0V

1x = FPGA tri-states TMODE3 pin

**Bits 5 and 4: DS26503 TMODE2 Tri-State and Level (TMODE2tri and TMODE2\_Lev)**

00 = FPGA drives TMODE2 with 3.3V

01 = FPGA drives TMODE2 with 0.0V

1x = FPGA tri-states TMODE2 pin

**Bits 3 and 2: DS26503 TMODE1 Tri-State and Level (TMODE1tri and TMODE1\_Lev)**

00 = FPGA drives with TMODE1 3.3V

01 = FPGA drives with TMODE1 0.0V

1x = FPGA tri-states TMODE1 pin

**Bits 1 and 0: DS26503 TMODE0 Tri-State and Level (TMODE0tri and TMODE0\_Lev)**

00 = FPGA drives TMODE0 with 3.3V

01 = FPGA drives TMODE0with 0.0V

1x = FPGA tri-states TMODE0 pin

Register Name: **LEVEL7**

Register Description: **DS26503 Pin Settings (L2, L1, L0)**

Register Offset: **0x0017**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	L2tri	L2_Lev	L1tri	L1_Lev	L0tri	L0_Lev
Default	0	0	0	0	0	0	0	0

**Note:** Settings for L2 are only valid in hardware mode ( $BIS[1:0] = 11$ ), and ignored for other modes. In serial mode ( $BIS[1:0] = 10$ ), L0 and L1 are used to set levels for CPHA and CPOL, respectively.

**Bits 5 and 4: DS26503 L2 Tri-State and Level (L2tri and L2\_Lev)**

- 00 = FPGA drives L2 with 3.3V
- 01 = FPGA drives L2 with 0.0V
- 1x = FPGA tri-states L2 pin

**Bits 3 and 2: DS26503 L1 Tri-State and Level (L1tri and L1\_Lev)**

- 00 = FPGA drives L1 with 3.3V
- 01 = FPGA drives L1 with 0.0V
- 1x = FPGA tri-states L1 pin

**Bits 1 and 0: DS26503 L0 Tri-State and Level (L0tri and L0\_Lev)**

- 00 = FPGA drives L0 with 3.3V
- 01 = FPGA drives L0 with 0.0V
- 1x = FPGA tri-states L0 pin

Register Name: **LEVEL8**

Register Description: **DS26503 Pin Settings (TAIS, RLB)**

Register Offset: **0x0018**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	TAIS tri	TAIS_Lev	—	—	RLBtri	RLB_Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode ( $BIS[1:0] = 11$ ), and is ignored for other modes.

**Bits 5 and 4: DS26503 TAIS Tri-State and Level (TAIS tri and TAIS\_Lev)**

- 00 = FPGA drives TAIS with 3.3V
- 01 = FPGA drives TAIS with 0.0V
- 1x = FPGA tri-states TAIS pin

**Bits 1 and 0: DS26503 RLB Tri-State and Level (RLBtri and RLB\_Lev)**

- 00 = FPGA drives RLB with 3.3V
- 01 = FPGA drives RLB with 0.0V
- 1x = FPGA tri-states RLB pin

Register Name: **LEVEL9**

Register Description: **DS26503 Pin Settings (MPS1, MPS0)**

Register Offset: **0x0019**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	MPS1tri	MPS1_Lev	—	—	MPSOtri	MPSO_Lev
Default	0	0	0	0	0	0	0	0

**Bits 5 and 4: DS26503 MPS1 Tri-State and Level (MPS1tri and MPS1\_Lev)**

00 = FPGA drives MPS1 with 3.3V

01 = FPGA drives MPS1 with 0.0V

1x = FPGA tri-states MPS1 pin

**Bits 1 and 0: DS26503 MPS0 Tri-State and Level (MPSOtri and MPSO\_Lev)**

00 = FPGA drives MPS0 with 3.3V

01 = FPGA drives MPS0 with 0.0V

1x = FPGA tri-states MPS0 pin

Register Name: **LEVEL10**

Register Description: **DS26503 Pin Settings (JAMUX, E1TS)**

Register Offset: **0x000A**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	JAMUXtri	JAMUX_Lev	—	—	E1Tstri	E1TS_Lev
Default	0	0	0	0	0	0	0	0

**Note:** This register is only valid in hardware mode ( $BIS[1:0] = 11$ ), and is ignored for other modes.

**Bits 5 and 4: DS26503 JAMUX Tri-State and Level (JAMUXtri and JAMUX\_Lev)**

00 = FPGA drives JAMUX with 3.3V

01 = FPGA drives JAMUX with 0.0V

1x = FPGA tri-states JAMUX pin

**Bits 1 and 0: DS26503 E1TS Tri-State and Level (E1Tstri and E1TS\_Lev)**

00 = FPGA drives E1TS with 3.3V

01 = FPGA drives E1TS with 0.0V

1x = FPGA tri-states E1TS pin

Register Name: **TSERsrc**

Register Description: **DS26503 TSER Pin Source**

Register Offset: **0x001C**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	—	—	—	ZEROS	ONES	RSER
Default	0	0	0	0	0	0	1	0

**Note:** Only one bit in this register should be set at a time. Setting multiple bits tri-states the FPGA pin connected to TSER. Setting to 0 also tri-states this pin.

**Bit 2: ZEROS.** When set DS26503\_TSER ← 0.0V.

**Bit 1: ONES.** When set DS26503\_TSER ← 3.3V.

**Bit 0: RSER.** When set DS26503\_TSER ← DS26503\_TSER.

Register Name: **MCLKsrc**

Register Description: **DS26503 MCLK Pin Source**

Register Offset: **0x001D**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	—	—	ZERO	EXT	T1	E1
Default	0	0	0	0	0	0	1	0

**Note:** Only one bit in this register should be set at a time. Setting multiple bits tri-states the FPGA pin connected to MCLK. Setting to 0 also tri-states this pin.

**Bit 3: ZERO.** When set DS26503\_MCLK ← 0.0V.

**Bit 2: EXT.** When set DS26503\_MCLK ← External\_Osc (BNC connector).

**Bit 1: T1.** When set DS26503\_MCLK ← T1\_OSC (1.544MHz).

**Bit 0: E1.** When set DS26503\_MCLK ← E1\_OSC (2.048MHz).

Register Name: **TCLKsrc**

Register Description: **DS26503 TCLK Pin Source**

Register Offset: **0x001E**

Bit #	7	6	5	4	3	2	1	0
Name	—	EXT	T1	E1	64KHZ	6312	PLL	RCLK
Default	0	0	1	0	0	0	0	0

**Note:** Only one bit in this register should be set at a time. Setting multiple bits tri-states the FPGA pin connected to TCLK. Setting to 0 also tri-states this pin.

**Bit 6: EXT.** When set DS26503\_TCLK ← External\_Osc (BNC connector).

**Bit 5: T1.** When set DS26503\_TCLK ← T1\_OSC (1.544MHz).

**Bit 4: E1.** When set DS26503\_TCLK ← E1\_OSC (2.048MHz).

**Bit 3: 64KHZ.** When set DS26503\_TCLK ← 64kHz clock.

**Bit 2: 6312.** When set DS26503\_TCLK ← 6312kHz clock.

**Bit 1: PLL.** When set DS26503\_TCLK ← DS26503\_PLL.

**Bit 0: RCLK.** When set DS26503\_TCLK ← DS26503\_RCLK.

Register Name: **TS\_8Ksrc**

Register Description: **DS26503 TS\_8K Pin Source**

Register Offset: **0x001F**

Bit #	7	6	5	4	3	2	1	0
Name	—	—	—	EXT	_8KHz	400HZ	400HZ_502	RS_8K
Default	0	0	0	0	0	0	1	0

**Note:** Only one bit in this register should be set at a time. Setting multiple bits tri-states the FPGA pin connected to TS\_8K. Setting to 0 also tri-states this pin.

**Bit 4: EXT.** When set DS26503\_TS\_8K ← External\_Osc (BNC connector).

**Bit 3: \_8KHz.** When set DS26503\_TS\_8K ← 8kHz (derived by FPGA).

**Bit 2: 400HZ.** When set DS26503\_TS\_8K ← 400Hz clock (derived by FPGA).

**Bit 1: 4KHZ\_502.** When set DS26503\_TS\_8K ← DS26503\_400hz.

**Bit 0: RS\_8K.** When set DS26503\_TS\_8K ← RS\_8K.

**DS26503 INFORMATION**

For more information about the DS26503, consult the DS26503 data sheet available on our website at [www.maxim-ic.com/DS26503](http://www.maxim-ic.com/DS26503). Software downloads are also available for this demo kit.

**DS26503DK INFORMATION**

For more information about the DS26503DK, including software downloads, consult the DS26503DK data sheet available on our website at [www.maxim-ic.com/DS26503DK](http://www.maxim-ic.com/DS26503DK).

**TECHNICAL SUPPORT**

For additional technical support, please e-mail your questions to [telecom.support@dalsemi.com](mailto:telecom.support@dalsemi.com).

**SCHEMATICS**

The DS26503DK schematics are featured in the remaining pages.

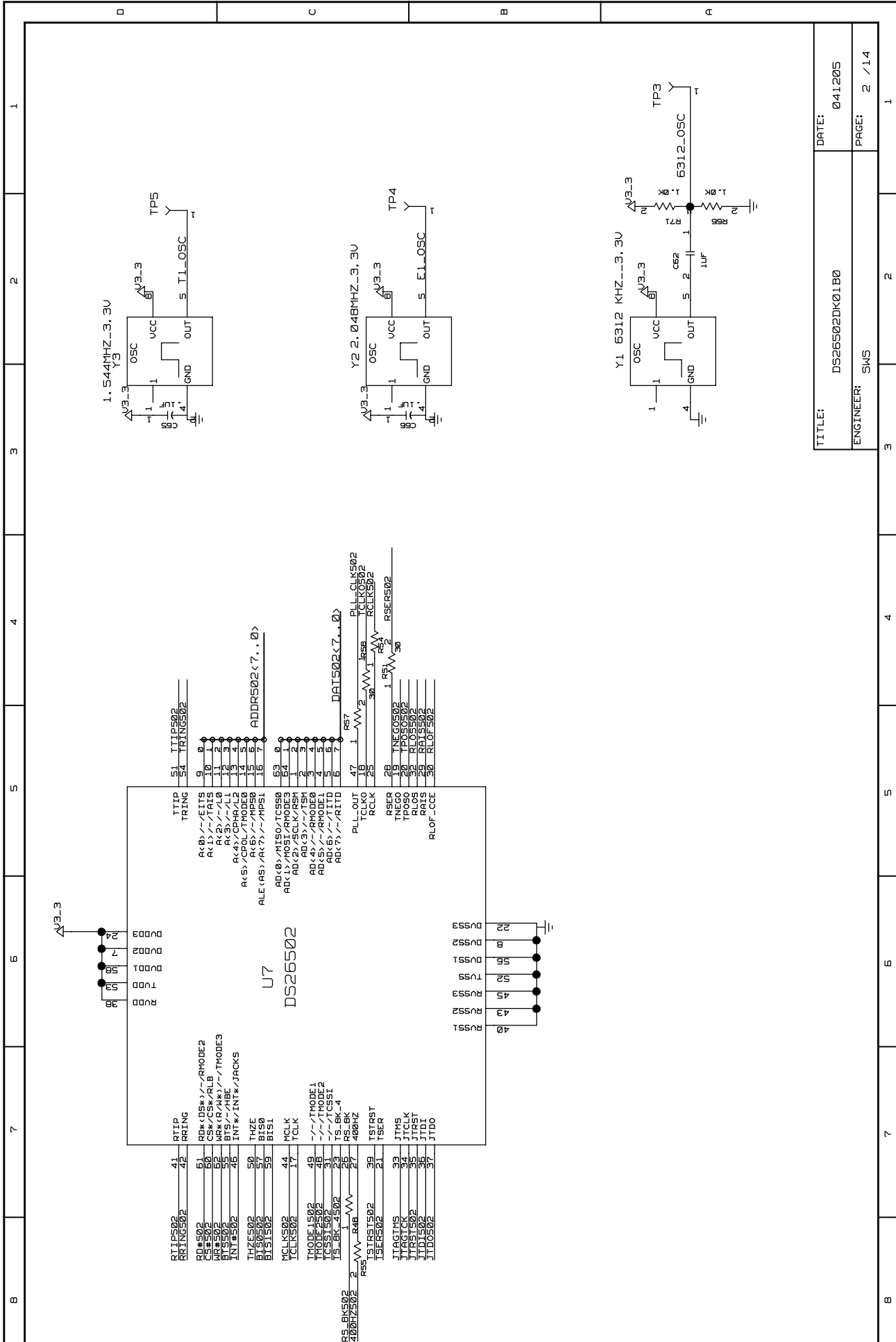


# DS26502 DESIGN KIT

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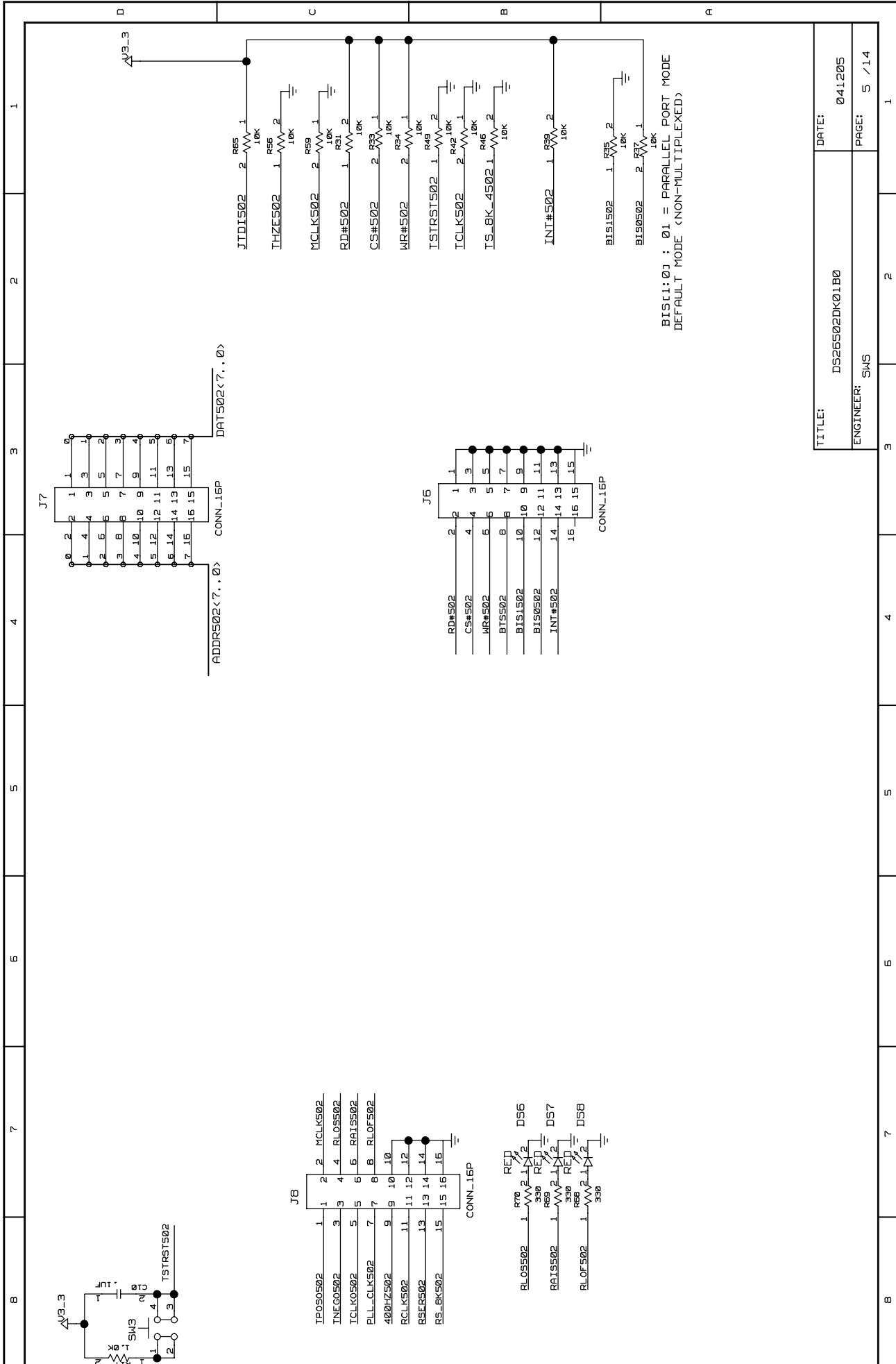
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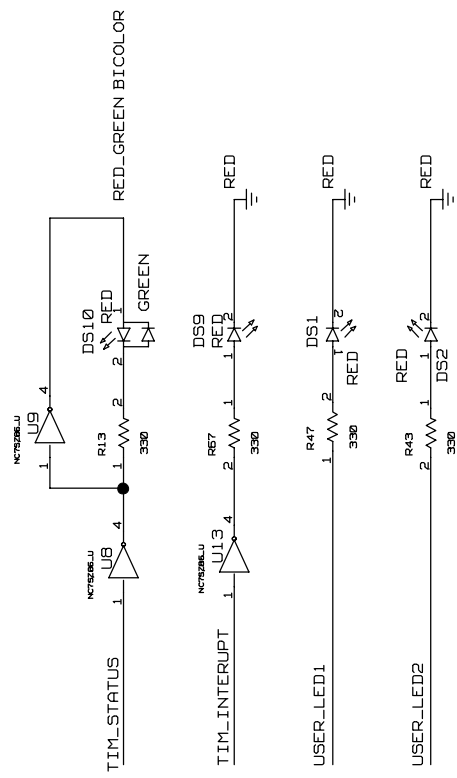
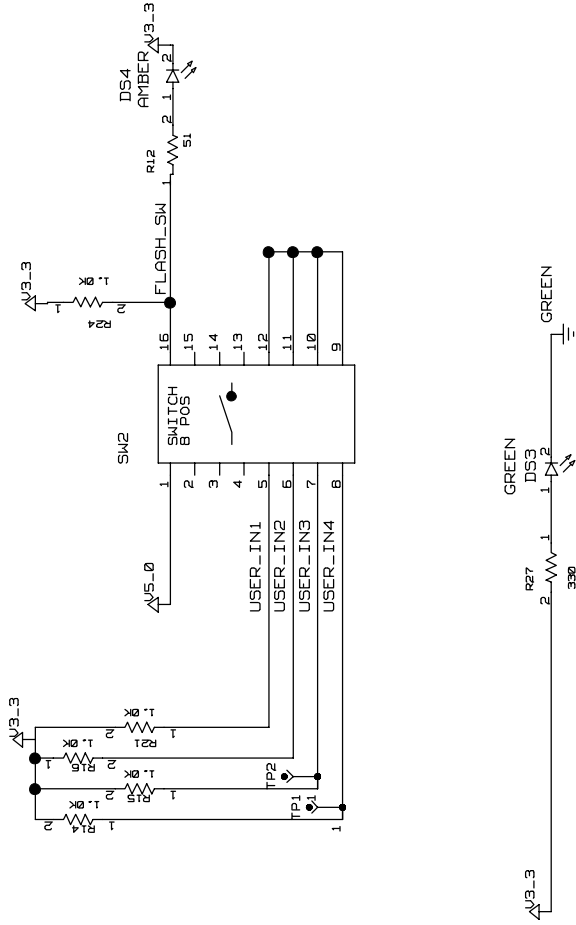
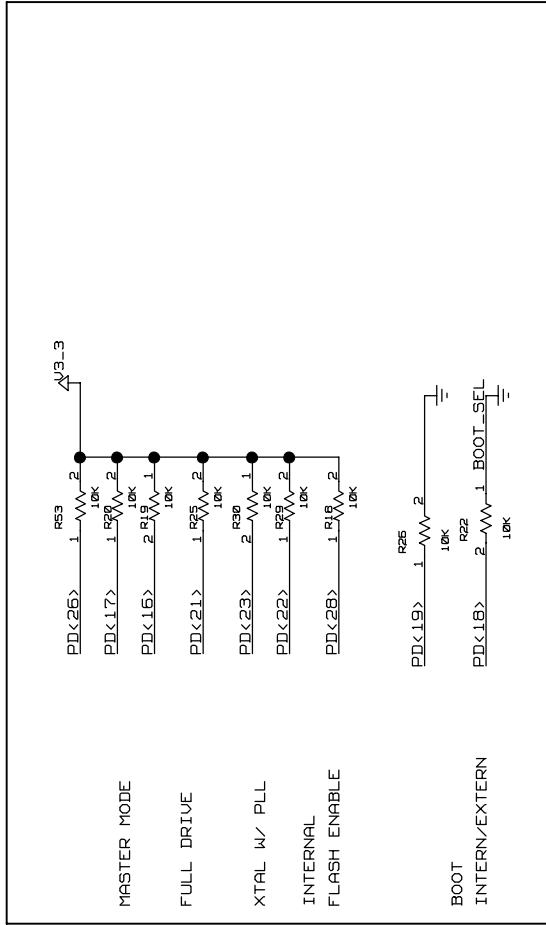






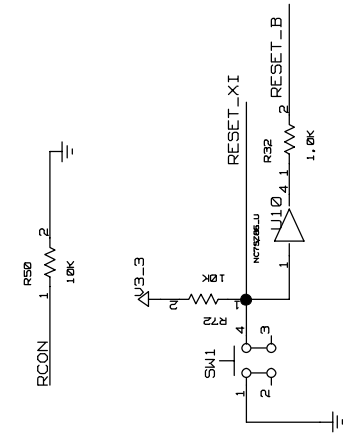


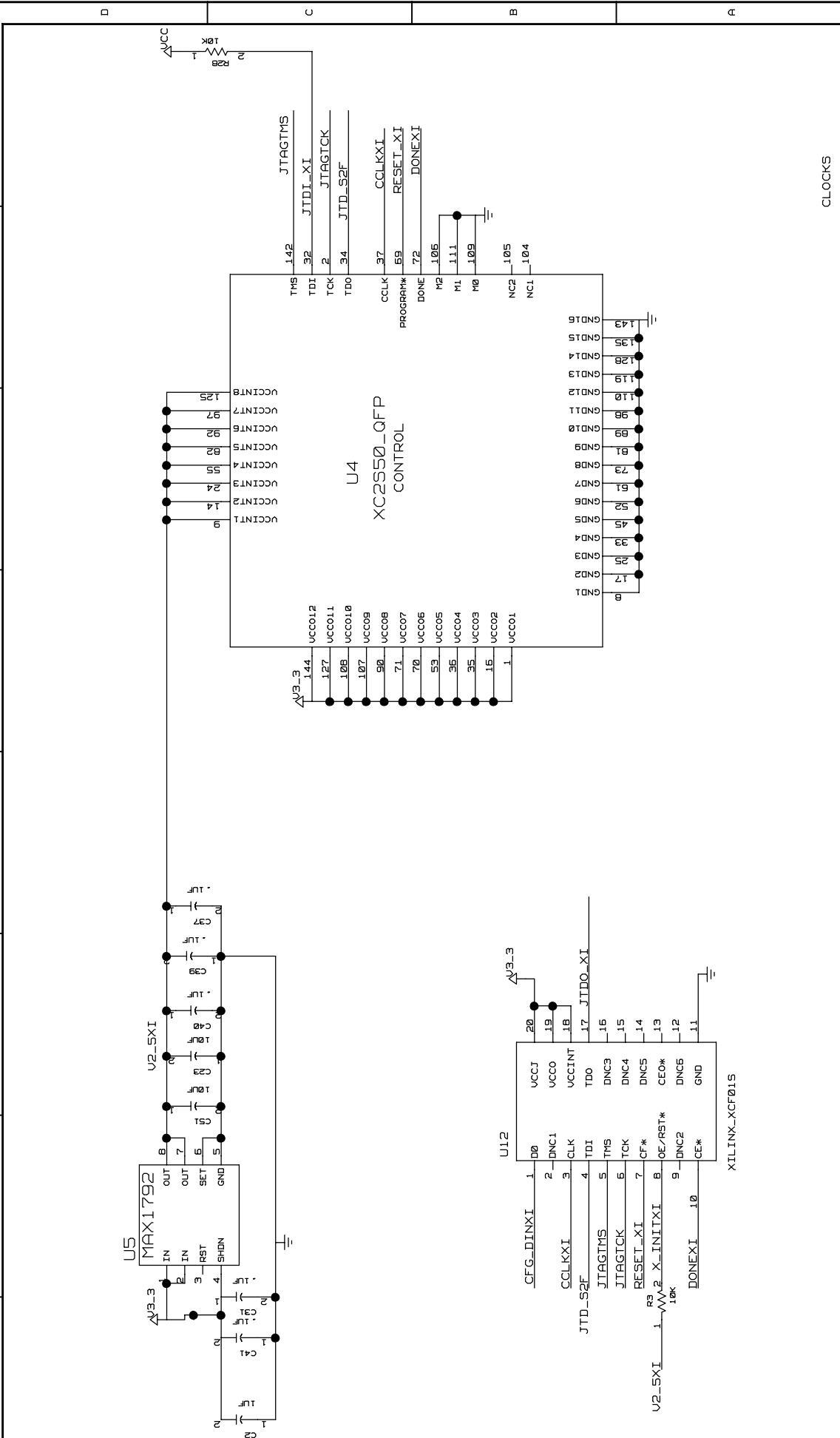
### RESET CONFIGURATION



### RESET AND CHIP CONFIGURATION

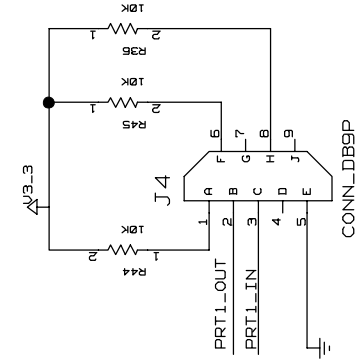
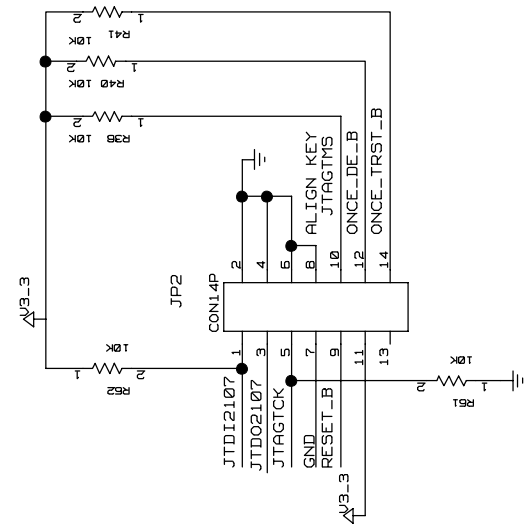
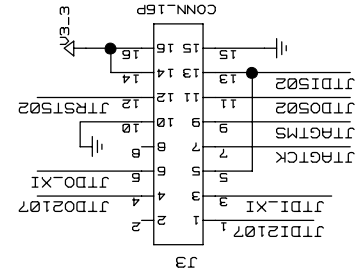
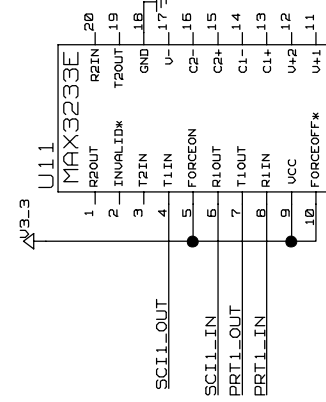
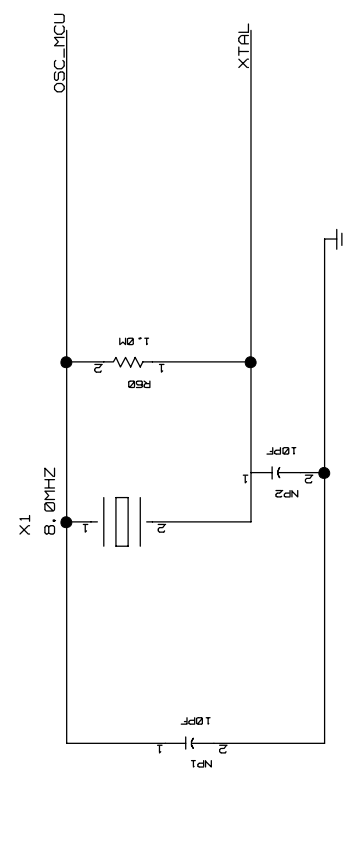
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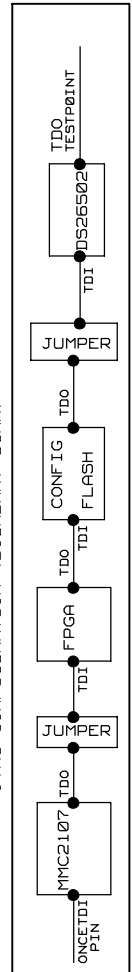




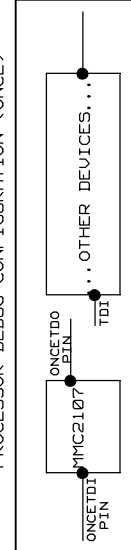
JTAG / ONCE  
DEBUG SELECTION



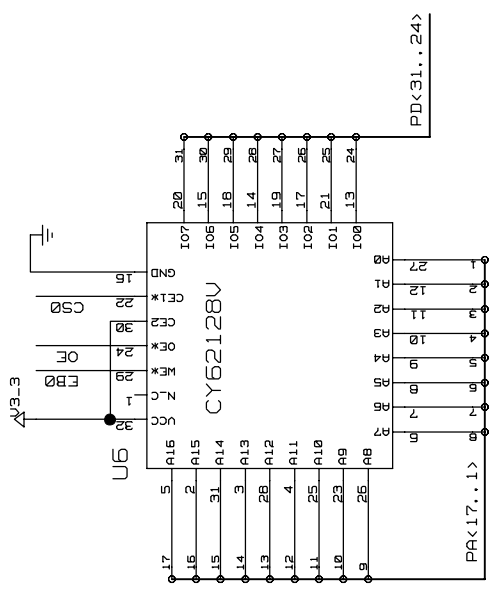
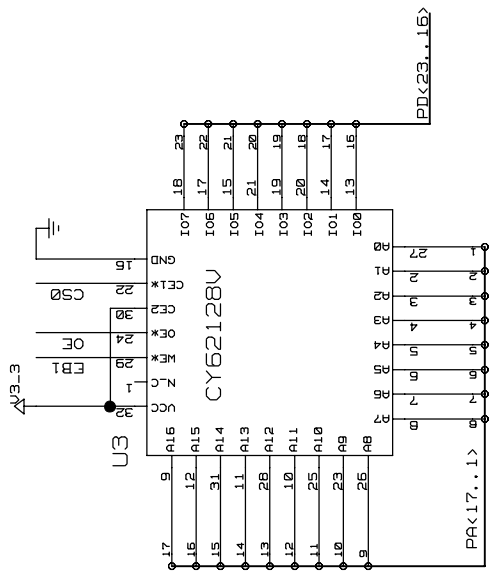
JTAG CONFIGURATION (BOUNDARY SCAN)



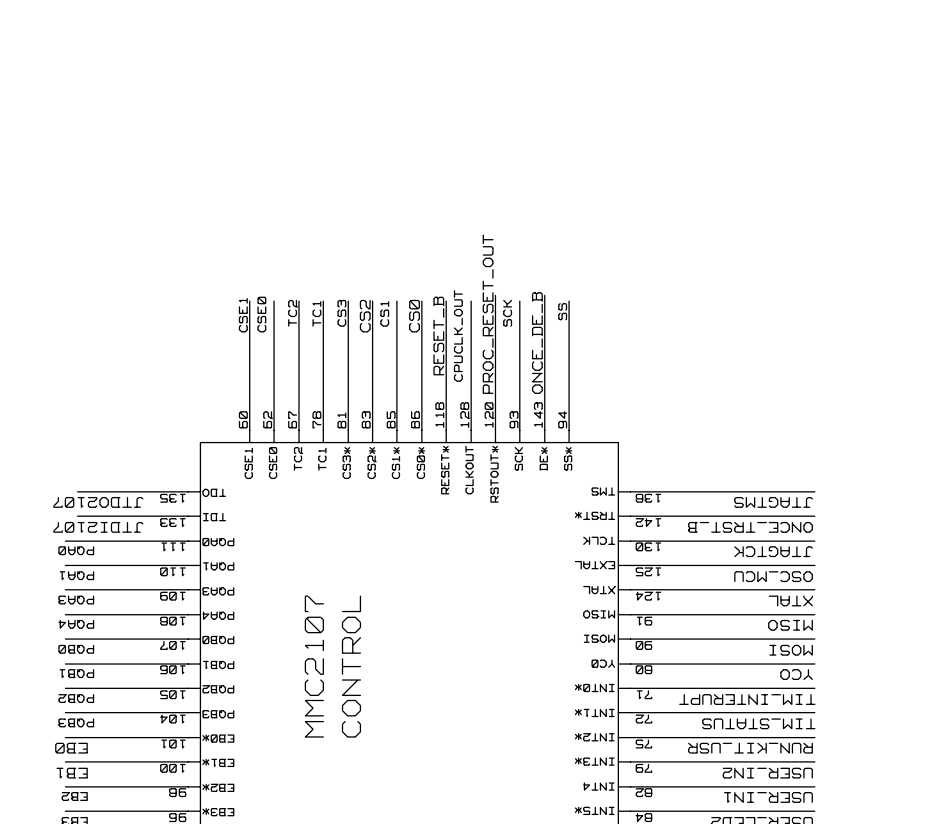
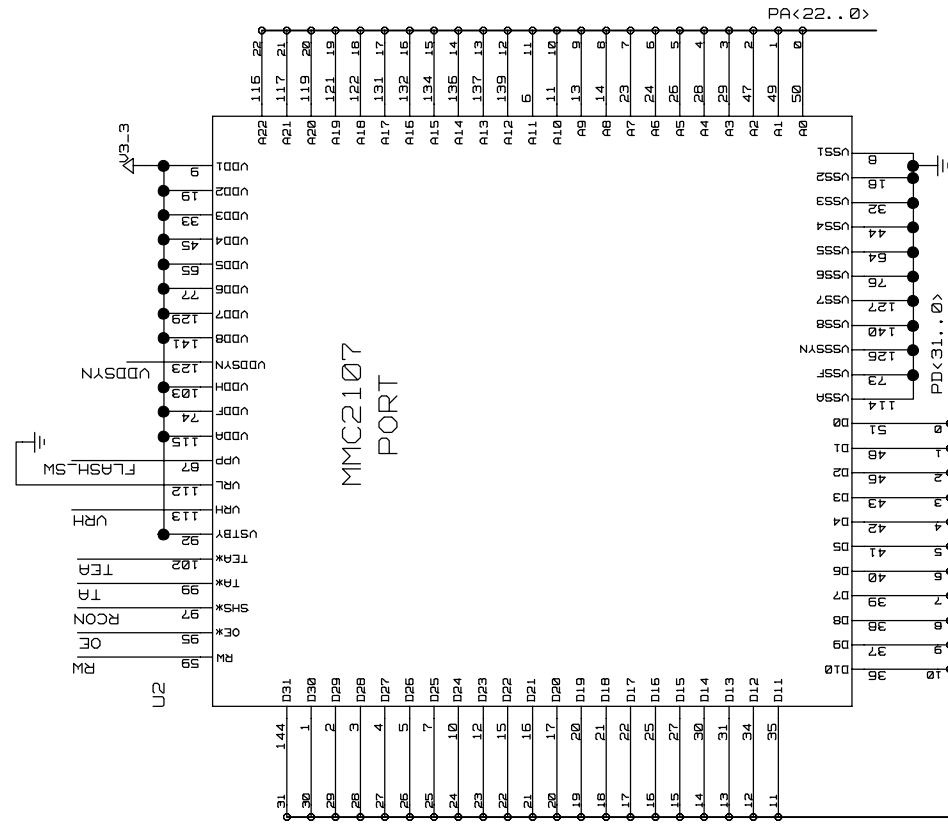
PROCESSOR DEBUG CONFIGURATION (ONCE)



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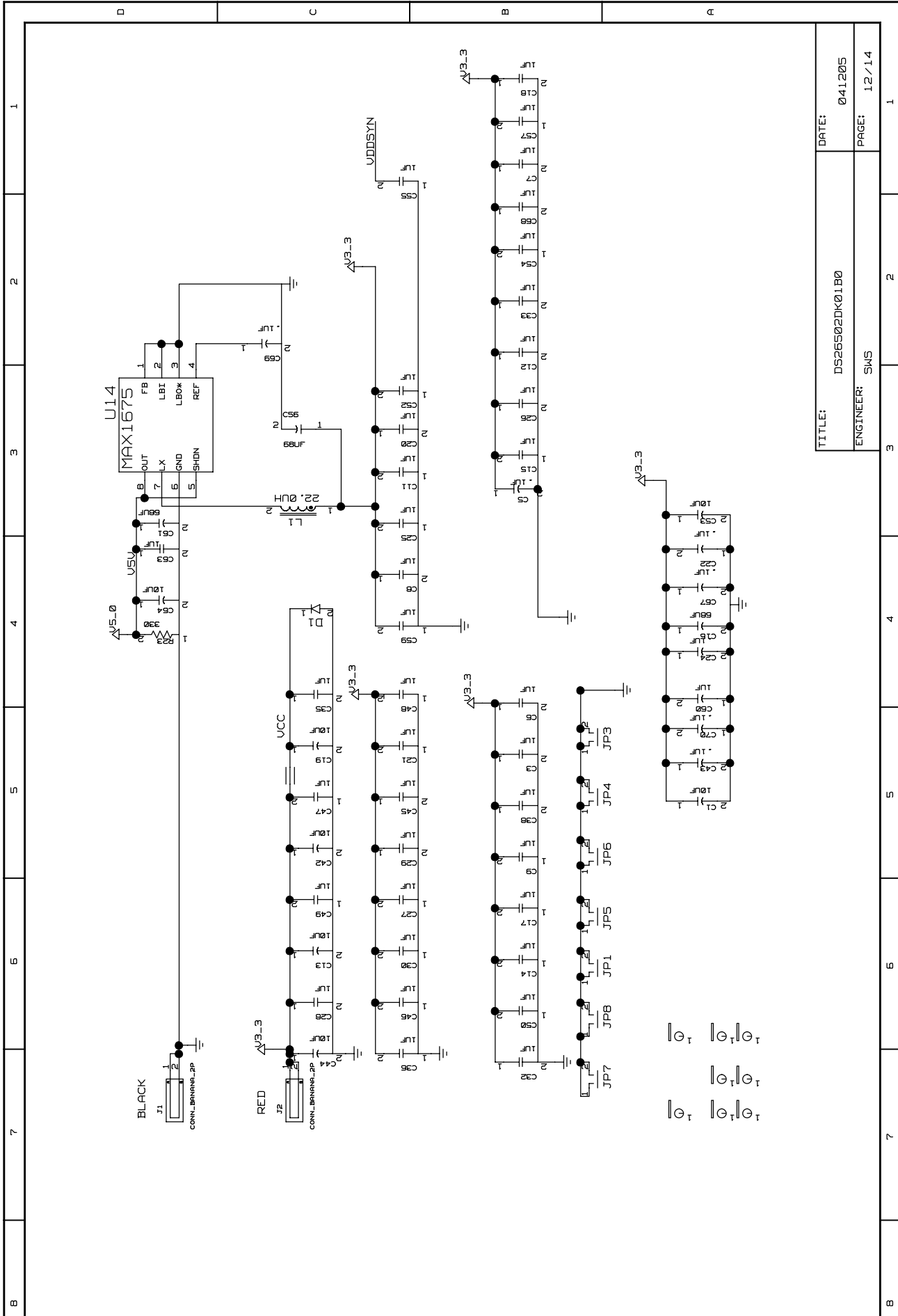


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TEST-POINTS FOR PROCESSOR

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1 2 3 4 5 6 7 8

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1 2 3 4 5 6 7 8

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1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

\*\*\* Signal Cross-Reference for the entire design \*\*\*

40PHZ502	406<> 50B4<> 20B<>
6312_O5C	2A1<> 405<>
ADDR502K7..0	2C4<> 4C1 5D4<>
B150502	4A3<> 5B4<> 2C8<> 5A2<>
B151502	4A2<> 5B4<> 2C8<> 5A2<>
BOOT_SEL	7B6<>
BTS502	4A2<> 5B4<> 2C8<>
CLKKI	8B7<> 8C1<>
C6.DINXI	4B5<> 8B7<>
CHCLK_OUT	8B5<> 8B5<> 4C6<>
CS0E	8B5<> 5D4<> 2C8<> 5C2<>
CS1	6B5<> 10D3<> 10D6<> 11C5<>
CS2	4A6<> 6C5<> 11C5<>
CS3	6C5<> 11C5<>
CSE0	6C5<> 11C5<>
CSE1	6C5<> 11C5<>
DAT502<7..0	2C4<> 5C2<> 4C4<>
E1_O5C	8A7<> 8B1<>
E1_O5C	2B5<> 4D6<>
E1_O5C	4B5<> 6D7<> 10D7<> 11D7<>
E81	4B5<> 6D7<> 10D3<> 11D7<>
E82	6D7<> 11D7<>
EXT_O5C	4D9<> 11D7<>
FLASH_SM	7D2<> 6D2<> 11D3<>
ICOC10	6B8<> 11B8<>
ICOC11	6B8<> 11C8<>
ICOC12	6C8<> 11C8<>
ICOC13	6C8<> 11C8<>
ICOC20	6C8<> 11C8<>
ICOC21	6C8<> 11C8<>
ICOC22	6C8<> 11C8<>
ICOC23	6C8<> 11C8<>
INT502	2C0<> 4B2<> 5B4<> 5B2<>
JTAG7CK	6A6<> 8A7<> 9B4<> 9C3<> 11A6<>
JTAGTMS	6A6<> 8A7<> 9B4<> 9C2<> 11A6<>
JTD1502	9B4<> 2B8<> 5C2<>
JTD12107	6D6<> 9B5<> 9C3<> 11D6<>
JTD1_X1	9B5<> 8C2<>
JTD0502	2B8<> 9B4<>
JTD02107	6D6<> 9C3<> 9C5<> 11D6<>
JTD0_X1	8B7<> 8C1<>
JTD1_SF	9C4<> 2B8<>
JTR5T502	5C7<> 2C8<> 4A9<> 5C2<>
NCLK502	4A6<> 6A6<> 6B5<> 11A7<>
N150	4A6<> 6A6<> 6B5<> 11A7<>
NO51	4A6<> 6A6<> 6B5<> 11A7<>
OE	4A6<> 6A6<> 6B5<> 11A7<>
ONCE_DE_B	6B5<> 9B2<> 11B5<>
ONCE_TRST_B	6A6<> 9B2<> 11A6<>
OSC_NCU	6A6<> 9D5<> 11A6<>
PA<15..0>	4C4<>
PA<22..0>	6B1<> 11A1<>
PA<17..1>	10B4 10B7
PD<31..0>	6A2<> 11A2<>
PD<23..10>	10B2<>
PD<31..10>	10B4 10B6
PLL_CLK502	4D5<> 5C6<> 2C4<>
POA0	6D6<> 11D6<>
POA3	6D6<> 11D6<>
POA4	6D6<> 11D7<>
POB0	6D7<> 11D7<>
POB1	6D7<> 11D7<>
POB2	6D7<> 11D7<>
POB3	6D7<> 11D7<>
PROC_RESET_OUT	4D6<> 6B5<> 11B5<>
PT1_IN	9A8<> 9B8<>
PT1_OUT	9A8<> 9B8<>
RT1502	2B4<> 5C7<> 5B8<>

RCLK502	5B8<> 2C4<>
RCON	6D3<> 11D3<> 7B8<>
RD4502	4A3<> 5B4<> 2D8<> 5C2<>
RESET_B	6B5<> 9C3<> 11B5<> 7A6<>
RESET_X1	7A7<> 8A7<> 8C1<>
RLOF502	2B4<> 5C7<> 5B8<>
RLOS502	2B4<> 5C7<> 5B8<>
RRINGS02	2D8<> 3B7<>
RSCR502	4B1<> 5B8<> 2C4<>
RS_BK502	4D6<> 5B8<> 2C8<>
RTIP502	2D8<> 3B7<>
RUN_KIT_USR	6A7<> 11A7<>
SC11_IN	6B8<> 6B8<> 11B8<>
SC11_OUT	6B8<> 11B8<> 9B8<>
SC12_IN	6B8<> 11B8<>
SC12_OUT	6B8<> 11B8<>
SCK	4A6<> 6B5<> 11B5<>
S5	4A5<> 6B5<> 11B5<>
T1_O5C	2D2<> 4D6<>
TA	4A6<> 6D3<> 11D3<>
TC1	6C5<> 11C5<>
TC2	2C8<> 4A9<> 5B2<>
TCLK502	4A5<>
TCLK502A1	5C7<> 2C4<>
TCLK502B	2C8<> 4D3<>
TCS51502	6D3<> 11D3<>
TEA	6B8<> 11B8<>
TEST	4A3<> 2C8<> 5C2<>
THZE502	6D7<> 11D8<>
TIM_16H_LB	4B1<> 6A7<> 7A4<> 11A7<>
TIM_INTERRUPT	6A7<> 7B4<> 11A7<>
TIM_STATUS	4D3<> 2C8<>
THODE1502	4D3<> 2C8<>
THODE2502	2C4<> 5C8<>
THODE3502	2B4<> 5C8<>
THODE4502	4B1<> 2C8<>
TSE502	5D8<> 2C8<> 5B2<>
TS_BK_4502	4A3<> 2C8<> 5B2<>
TS_BK_4502	2D4<> 3C9<>
TTIP502	6A7<> 7C3<> 11A7<>
USER_IN1	6A7<> 7C3<> 11A7<>
USER_IN2	7C3<>
USER_IN3	7C3<>
USER_IN4	7C3<>
USER_LED1	6A7<> 11A8<> 7A4<>
USER_LED2	6A7<> 11A7<> 7A4<>
V2_SX1	6D6<> 8B8<>
V5V	1D04<> 11D3<> 12C1<>
WDRSTBYN	6D5<> 11D3<>
WR4	6D5<> 11D3<>
WR4502	4A3<> 5B4<> 2C8<> 5B2<>
XTAL	6A6<> 5C5<> 11A7<>
X_INITX1	4A2<> 8A7<>
YCO	6A7<> 11A7<>

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\*\*\* Part Cross-Reference for the entire design \*\*\*

C1	CAP1	12A5
C2	CAP1	12B5
C3	CAP	12B5
C4	CAP	30B5
C5	CAP1	12B3
C6	CAP	12B5
C7	CAP	12B1
C8	CAP	12B4
C9	CAP	12B5
C10	CAP1	30B5
C11	CAP	12B5
C12	CAP	12C2
C13	CAP	12C6
C14	CAP	12B6
C15	CAP	12B3
C16	CAP1	12A4
C17	CAP	12B6
C18	CAP	12B1
C19	CAP	12C5
C20	CAP	12B3
C21	CAP	12B5
C22	CAP1	12A4
C23	CAP1	52A4
C24	CAP1	52A4
C25	CAP	12B3
C26	CAP	12B3
C27	CAP	12B6
C28	CAP	12C6
C29	CAP	12B5
C30	CAP	12B6
C31	CAP1	6C8
C32	CAP	12B7
C33	CAP	12B2
C34	CAP1	3B6
C35	CAP	12C4
C36	CAP	6C7
C37	CAP1	6C7
C38	CAP	12B5
C39	CAP1	6C6
C40	CAP1	6C6
C41	CAP1	6C8
C42	CAP	12C5
C43	CAP1	12A5
C44	CAP	12C7
C45	CAP	12B5
C46	CAP	12B6
C47	CAP	12C5
C48	CAP	12B4
C49	CAP	12B6
C50	CAP	12B6
C51	CAP1	6C7
C52	CAP	12B3
C53	CAP1	12A3
C54	CAP	12B2
C55	CAP	12B1
C56	CAP	12C3
C57	CAP	12B1
C58	CAP1	4D1
C59	CAP	12B4
C60	CAP1	12A4
C61	CAP1	20D3
C62	CAP1	20D3
C63	CAP	12D4
C64	CAP	12D4
C65	CAP1	20D3
C66	CAP1	2B3
C67	CAP1	12A4
C68	CAP	12B2
C69	CAP1	12C2
C70	CAP1	12A5
D1	D10DE	12C4
D51	LED	7A3
D52	LED	7A3
D53	LED	7D3
D54	LED	7D1

D55	LED	4B1
D56	LED	5B7
D57	LED	5B7
D58	LED	7B3
D59	LED	7B3
D510	LED2	7B3
J1	CONN-BANKNA_LP	12D7
J2	CONN-BANKNA_LP	12C7
J3	CONN_LBP	9B5
J4	CONN_DBP	9A7
J5	CONN_BNC_SP	4D1
J6	CONN_LBP	9B3
J7	CONN_LBP	9B3
J8	CONN_LBP	5C7
J9	CONN_374B	3B4
J10	CONN_BNC_SP	3D3
J11	CONN_BNC_SP	3A4
J12	CONN_BANTAM_IPC	3C2
J13	CONN_BANTAM	3B2
JP1	JHP	12B6
JP2	CON14P	9C2
JP3	JHP	12B5
JP4	JHP	12B5
JP5	JHP	12B6
JP6	JHP	12B5
JP7	JHP	12B5
JP8	JHP	12B6
L1	COIL_SP	12C3
MNT_HOLE1	MNT_HOLE	12A6
MNT_HOLE2	MNT_HOLE	12A6
MNT_HOLE3	MNT_HOLE	12A7
MNT_HOLE4	MNT_HOLE	12A6
MNT_HOLE5	MNT_HOLE	12A7
MNT_HOLE6	MNT_HOLE	12A7
MNT_HOLE7	MNT_HOLE	12A7
MNT_HOLE8	MNT_HOLE	12A7
NP1	CAP	9C8
NP2	CAP	9C8
P1	RES1	6D2
P2	RES1	4B1
P3	RES1	8A7
R4	RES1	4F3
R5	RES1	4F3
R6	RES1	3B6
R7	RES1	3B6
R8	RES1	3C7
R9	RES1	3D7
R10	RES1	3B6
R11	RES1	3B6
R12	RES1	7D1
R13	RES1	7D1
R14	RES1	7D4
R15	RES1	7D4
R16	RES1	7D4
R17	RES1	5D8
R18	RES1	7C7
R19	RES1	7D7
R20	RES1	7D7
R21	RES1	7D4
R22	RES1	7C7
R23	RES1	12D4
R24	RES1	7D2
R25	RES1	7D7
R26	RES1	7C7
R27	RES1	7C7
R28	RES1	6C1
R29	RES1	7C7
R30	RES1	7C7
R31	RES1	5C1
R32	RES1	7A7
R33	RES1	5C1
R34	RES1	5C1
R35	RES1	5A1
R36	RES1	9A7
R37	RES1	5A1
R38	RES1	5C1
R39	RES1	5B1

R40	RES1	9C1
R41	RES1	5B1
R42	RES1	5B1
R43	RES1	7A3
R44	RES1	9A7
R45	RES1	9A7
R46	RES1	5B1
R47	RES1	7A3
R48	RES1	2C7
R49	RES1	5B1
R50	RES1	7D8
R51	RES1	5C4
R52	RES1	5C4
R53	RES1	7D7
R54	RES1	2C4
R55	RES1	2C8
R56	RES1	5C1
R57	RES1	2C5
R58	RES1	2C4
R59	RES1	5C1
R60	RES1	9D6
R61	RES1	9B2
R62	RES1	9C2
R63	RES1	4D2
R64	RES1	4D2
R65	RES1	2A2
R66	RES1	2A2
R67	RES1	7A5
R68	RES1	5B7
R69	RES1	5B7
R70	RES1	5B7
R71	RES1	2A2
R72	RES1	7A8
S1	PUSHBUTTON	7A8
S2	SWITCH_8POS	7D2
S3	PUSHBUTTON	5B8
T1	XPRZLN_400_UJ	3B5 3D5
T2	TESTPOINT_L1	7C4
T3	TESTPOINT_L1	7C4
T4	TESTPOINT	2A1
T5	TESTPOINT	2C2
T6	TESTPOINT	2D2
T7	TESTPOINT	4D2
T8	TESTPOINT	4D2
T9	TESTPOINT	4D2
T10	TESTPOINT	4D2
U1	MPC2107	6D3 6D8
U2	MPC2107	11C4 11D8
U3	CY6212B0	10C4
U4	CY6212B0	10C4
U5	MX1792	8D3 4C6 6C3
U6	MX1792	8D3
U7	DS26S02	1U1 2G5
U8	NC75ZB6	7B4
U9	NC75ZB6	7B3
U10	NC75ZB6	7A7
U11	MK3233E	9B7
U12	XLINK-KCF015	8B7
U13	NC75ZB6	7A4
U14	MX1675	12D3
X1	XTHL	9D7
Y1	08C1	8A5
Y2	08C1	8A5
Y3	08C1	2D3
Y5	08C1	2D3

REVISION HISTORY:  
 041205 - INITIAL RELEASE OF 01B0 VERSION.  
 THIS VERSION IS EXACTLY LIKE THE 01A0  
 VERSION EXCEPT FOR THE FOLLOWING:  
 - SIGNAL RCLK502 WAS CONNECTED TO THE  
 FPGA, U4, AT PIN 63.  
 - THE PINS WERE SWAPPED ON C13, C42 & C61

TITLE: DS26502DK01B0  
 ENGINEER: SWS  
 DATE: 041205  
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