

### GENERAL DESCRIPTION

The DS26521DK is an easy-to-use evaluation kit for the DS26521 T1/E1/J1 single-chip transceiver (SCT). The DS26521DK is intended to be used as a stand-alone system. The board comes complete with a transceiver, transformer, termination resistors, configuration switches, network connectors, microprocessor, and RS-232 connector. The on-board processor and Dallas' ChipView software give 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.

*Windows is a registered trademark of Microsoft Corp.*

### DESIGN KIT CONTENTS

DS26521DK PC Board

CD\_ROM Including:

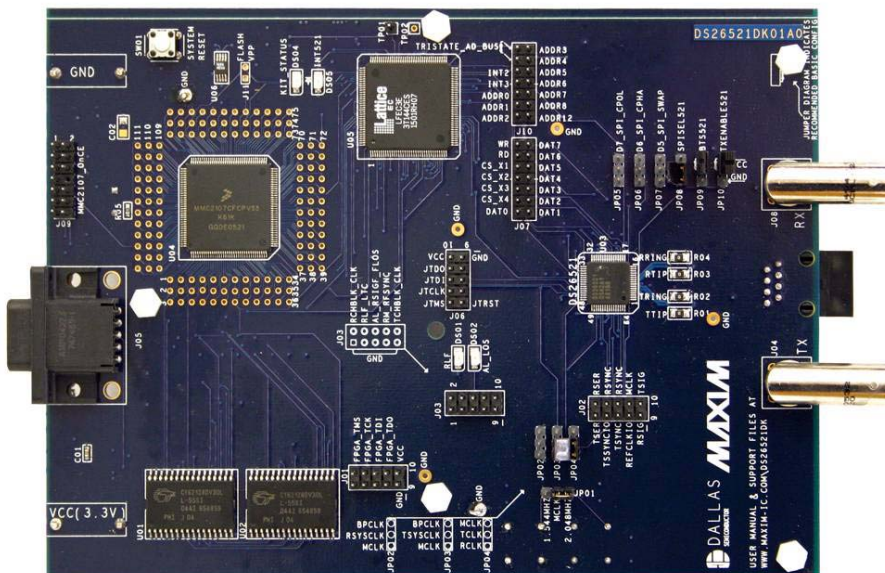
- ChipView Software
- DS26521 Definition Files
- DS26521 Initialization Files
- DS26521DK Data Sheet
- DS26521 Data Sheet
- DS26521 Errata Sheet (if applicable)

### FEATURES

- Demonstrates Key Functions of DS26521 T1/E1/J1 SCT
- Includes Transceiver, Transformers, and Termination Passives
- BNC Connections for 75Ω E1
- RJ48 Connector for 120Ω E1 and 100Ω T1
- On-Board Processor and ChipView Software Provide Point-and-Click Access to the DS26521 Register Set
- Accessible Address/Data Bus with Tri-State Control to Allow Interface for External Processor
- All Equipment-Side Framer Pins are Easily Accessible for External Data Source/Sink
- LEDs for Loss-of-Signal and Interrupt Status
- Easy-to-Read Silkscreen Labels Identify the Signals Associated with All Connectors, Jumpers, and LEDs

### ORDERING INFORMATION

PART	DESCRIPTION
DS26521DK	Design Kit for DS26521



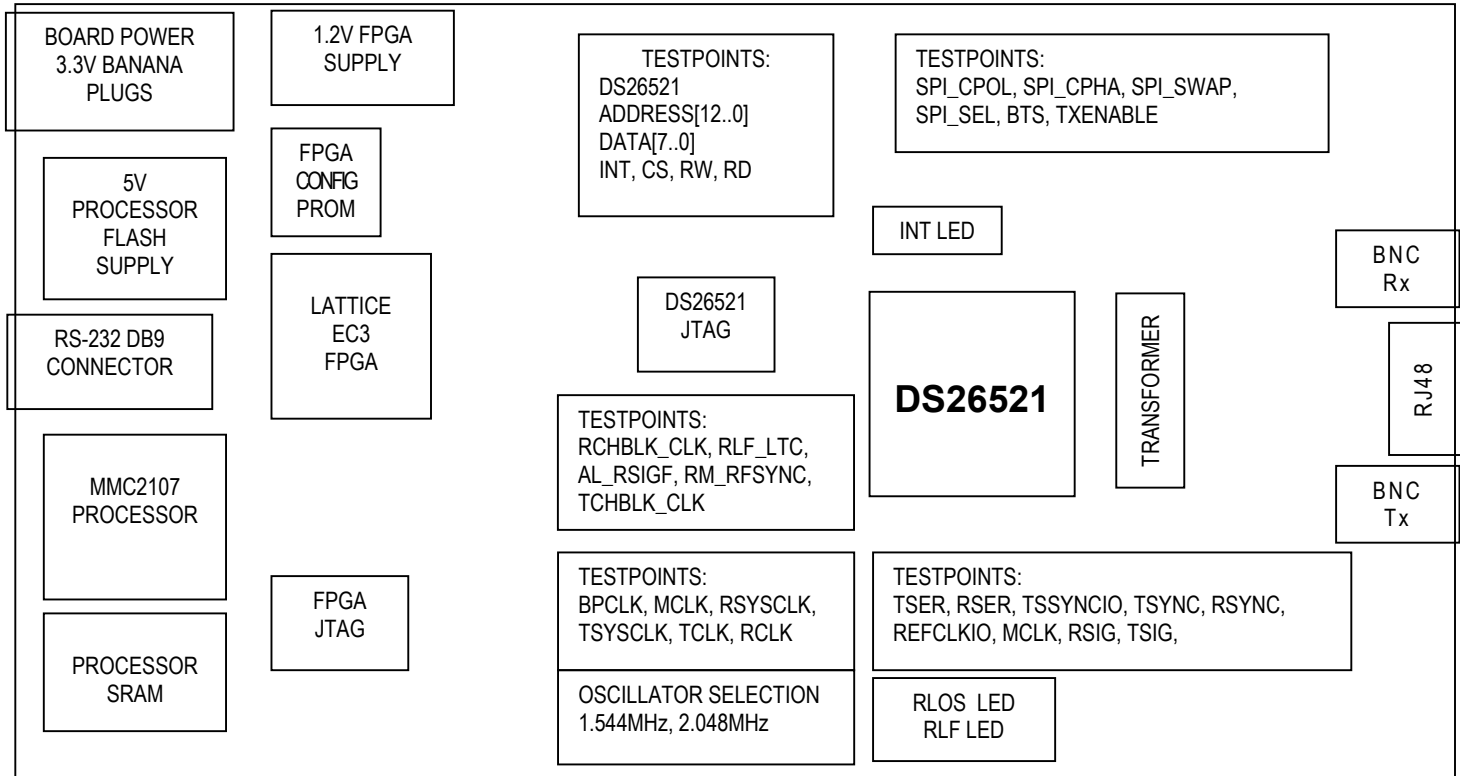
**COMPONENT LIST**

DESIGNATION	QTY	DESCRIPTION	SUPPLIER/PART
C01, CB07, CB08, CB10, CB12, CB16, CB18, CB19, CB21, CB23, CB26, CB32, CB39–CB41	15	0.1 $\mu$ F $\pm$ 10%, 16V ceramic capacitors (0603)	Phycomp 06032R104K7B20D
C02	1	1 $\mu$ F $\pm$ 10%, 16V ceramic capacitor (1206)	Panasonic ECJ-3YB1C105K
CB01, CB02, CB05, CB06, CB11, CB14, CB20, CB28, CB31, CB34, CB36, CB37	12	10 $\mu$ F $\pm$ 20%, 10V ceramic capacitors (1206)	Panasonic ECJ-3YB1A106M
CB03, CB04, CB13, CB17, CB24, CB25, CB29, CB38	8	4.7 $\mu$ F, 6.3V multilayer ceramic capacitors (0603)	Digi-Key ECJ-1VB0J475M
CB09	1	560pF $\pm$ 5%, 50V ceramic capacitor (1206)	Digi-Key 478-1489-2-ND
CB15, CB22, CB27, CB33, CB35	5	0.1 $\mu$ F $\pm$ 20%, 16V X7R ceramic capacitors (0603)	Arrow 0603YC104MAT2
CB30	1	470 $\mu$ F $\pm$ 20%, 6.3V tantalum capacitor (D case)	Digi-Key 399-3002-1-ND
DB01	1	1A 40V Schottky diode	International Rectifier 10BQ040
DS01, DS02, DS05	3	Red LEDs, SMD	Panasonic LN1251C
DS04	1	Green LED, SMD	Panasonic LN1351C
GND_TP01–GND_TP06	6	Standard ground clips	Keystone 4954
H1–H5, H10	6	Kit, 4-40 hardware, 0.50 nylon standoff and nylon hex-nut	Lab Stock 4-40KIT4
J01–J03, J06	4	10-pin, dual-row, vertical terminal strips	Samtec TSW-105-07-T-D
J04, J08	2	5-pin right-angle BNC connectors	Trompetor UCBJR220
J05	1	DB9 right-angle connector (long case)	AMP 747459-1
J07, J10	2	Nonpopulated 14-pin, dual-row, vertical headers	Samtec NOPOP-HDR-TSW-107-14-T-D
J09	1	100-mil, 2 x 7-position jumper	Lab Stock
J11	1	100-mil, 2-position jumper	Lab Stock
JB01	1	Red banana plug socket, horizontal	Mouser Electronics 164-6219
JB02	1	8-pin single-port RJ48 connector	Molex 15-43-8588
JB03	1	Black banana plug socket, horizontal	Mouser Electronics 164-6218
JP01–JP09, JP10	10	100-mil, 3-position jumpers	Lab Stock
R01–R04, RB47	5	0 $\Omega$ $\pm$ 5%, 1/8W resistors (1206)	Panasonic ERJ-8GEYJ0R00V
R05, RB35–RB40, RB45, RB46	9	1.0k $\Omega$ $\pm$ 5%, 1/16W resistors (0603)	Panasonic ERJ-3GEYJ102V

DESIGNATION	QTY	DESCRIPTION	SUPPLIER/PART
R06, R07, RB06, RB07, RB44, RB54, RB55	7	10k $\Omega$ $\pm$ 5%, 1/16W resistors (0603)	Panasonic ERJ-3GEYJ103V
RB01–RB05, RB11, RB23–RB26, RB28, RB29	12	30 $\Omega$ $\pm$ 5%, 1/16W resistors (0603)	Panasonic ERJ-3GEYJ300V
RB08, RB09, RB10, RB14–RB22, RB27, RB32, RB33, RB43, RB48	17	10k $\Omega$ $\pm$ 5%, 1/16W resistors (0603)	Panasonic ERJ-3GEYJ103V
RB12, RB13, RB50	3	330 $\Omega$ $\pm$ 5%, 1/16W resistors (0603)	Panasonic ERJ-3GEYJ331V
RB30, RB31	2	61.9 $\Omega$ $\pm$ 1%, 1/10W resistors (0805)	Panasonic ERJ-6ENF61R9V
RB34	1	1.0M $\Omega$ $\pm$ 5%, 1/16W resistor (0603)	Panasonic ERJ-3GEYJ105V
RB41	1	51.1 $\Omega$ $\pm$ 1%, 1/10W resistor (0805)	Panasonic ERJ-6ENF51R1V
RB42	1	10k $\Omega$ $\pm$ 1%, 1/10W resistor (0805)	Panasonic ERJ-6ENF1002V
RB51	1	0 $\Omega$ $\pm$ 5%, 1/16W resistor (0603)	Panasonic ERJ-3GEY0R00V
RB52	1	330 $\Omega$ $\pm$ 5%, 1/16W resistor (0603)	Panasonic ERJ-3GEYJ331V
RB53	1	1.0k $\Omega$ $\pm$ 5%, 1/16W resistor (0603)	Panasonic ERJ-3GEYJ102V
SW01	1	4-pin single-pole switch	Panasonic EVQPAE04M
TB01	1	16-pin SMT transformer	Pulse Engineering TX1099
TP01, TP02	2	Testpoints, one plated hole <b>DO NOT STUFF</b>	Lab Stock
U01, U02	2	Cypress SRAM	Lab Stock
U03	1	Single T1/E1/J1 transceiver, 64-pin, 10mm x 10mm LQFP	Dallas Semiconductor DS26521
U04	1	MMC2107 processor	Motorola MMC2107
U05	1	1.2V FPGA 144-pin, 20mm x 20mm TQFP	Lattice LFEC3E-3T144C
U06	1	3V to 5V regulating charge pump	Maxim MAX1686HEUA
UB01	1	Dual RS-232 transceivers with 3.3V/5V internal capacitors	MAXIM NA
UB02	1	Microprocessor voltage monitor, 2.93V reset, 4-pin SOT143	Maxim MAX811SEUS-T
UB04	1	SPI serial EEPROM, 2M, 2.7V to 3.6V, 8-pin SO	Atmel AT25F2048N-10SU-2.7
UB05	1	LDO regulator with reset, 1.20V output, 300mA, 6-pin SOT23	Maxim MAX1963EZT120-T
YB01	1	Oscillator, crystal clock 3.3V, 1.544MHz	SaRonix NTH039A3-1.5440

DESIGNATION	QTY	DESCRIPTION	SUPPLIER/PART
YB02	1	Oscillator, crystal clock 3.3V, 2.048MHz	SaRonix NTH039A3-2.0480
XB01	1	8.0MHz low-profile crystal	PEI Sales Inc. EC1-8.000M

## BOARD FLOORPLAN



## PC BOARD ERRATA

DS26521DK01A0 10/10/2005:

There is no errata for the DS26521DK01A0 design.

DS26521DK02A0 11/22/2005:

There is no errata for the DS26521DK02A0 design.

## BASIC OPERATION

This design kit relies upon several supporting files, which are available for downloading on our website at [www.maxim-ic.com/DS26521DK](http://www.maxim-ic.com/DS26521DK) QuickView page.

### Hardware Configuration

- Supply 3.3V to the banana-plug receptacles marked GND and VCC\_3.3V.
- Install the following jumpers (detailed in Table 2):
  - JP01—Connect MCLK to 2.048MHz (for both T1 and E1).
  - Connect JP02 MCLK to RSYSCLK, JP03 MCLK to TSYCLK, JP04 TCLK to RCLK.
  - JP08 SPI\_SEL to GND, JP09 BTS to VCC, TXENABLE to VCC.
- 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 RLF and AL\_LOS LEDs (red) will be lit, and the INT LED (red) will not be lit. The board will draw approximately 200mA at power-up.

### 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 request a definition file. Navigate to the .def files in the T1 or E1 folder, then select the file named *DS26521\_GLOBAL\_T1.def* (T1 mode) or *DS26521\_GLOBAL\_E1.def* (E1 mode). Note: Through the “links” section this will also load the LIU def file and framer def file.
- The *Register View Screen* will appear, showing the register names, acronyms, and values for the DS26521.
- 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 *Load\_T1\_LBO0\_0\_133\_impMatchOn.ini* (T1 mode) or *Load\_E1\_75\_impMatchOn.ini* (E1 mode).
  - After loading the .ini file, the following may be observed:
    - The DS26521 begins transmitting AIS with impedance match.
    - The AL\_LOS LEDs extinguishes upon external loopback.

#### Miscellaneous:

- The DS26521 uses three register definition files. All three files are loaded when the *DS26521\_GLOBAL\*.def* file is loaded. Individual files are selected from the **Def File Selection** menu in ChipView.

## ADDRESS MAP

The on-board microcontroller is configured to start the user address space at 0x81000000. All offsets given below are relative to the beginning of the user address space.

**Table 1. Address Map**

OFFSET	DEVICE	DESCRIPTION
0X0000 to 0X0087	FPGA	Board Identification and FPGA Test Registers
0X1000 to 0X2FFF	DS26521	DS26521 Framer, LIU, and BERT Registers

## TESTPOINTS AND CONNECTORS

The DS26521DK has several connectors, testpoints, oscillators, and jumpers. Table 2 provides a description of these signals, given in order of appearance on the PC board, from left to right then top to bottom (with the board held so that the RS-232 connector is on the top edge).

**Table 2. Main Board PC Board Configuration**

SILKSCREEN REFERENCE	FUNCTION	DEFAULT SETTING	SCHEMATIC PAGE	DESCRIPTION
VCC 3.3V (banana plug)	Power supply VDD	3.3V	2	System VDD. Always connected to power supply.
GND (banana plug)	Power supply Ground	GND	2	System Ground. Always connected to power supply.
J05	RS232 Connector	Connected to Host PC	8	Used for Communication with Host PC. Basic setting is 57.6k baud, 8 bits, no stop bit, 1 parity bit (57.6, 8, N, 1).
J09	OnCE BDM Connector	—	8	OnCE Debug Connector for MMC2107 Processor
SW01	System Reset	—	6	System Reset. Connects to all device reset pins.
J11	Flash VPP Jumper	Not Installed	8	Provides Flash Programming Voltage (5V) to Processor
J01	FPGA, JTAG	—	11	JTAG Connector for Lattice EC3 FPGA
TP01, TP02	FPGA, Testpoint	—	11	FPGA Init and Done Pins
J03	DS26521 Testpoints	—	5	Testpoints for DS26521 Pins: RCHBLK_CLK, RLF_LTC, AL_RSIGF, RM_RFSYNC, TCHBLK_CLK
J06	DS26521 JTAG	—	3	JTAG Connector for DS26521
YB01, YB02 (Bottom side of PC Board)	Oscillators	—	5	Oscillators for 2.048MHz and 1.544MHz
J07, J10	Testpoints	—	10	Testpoints for DS26521 Address/Data Bus and Control Lines
J10.12 + J10.14	Bus Tri-State	Not Jumpered	10	—
JP01	MCLK Selection	Jumpered pins 2+3	5	MCLK Selection: 1.544MHz, 2.048MHz (default)
JP02	RSYSCLK Selection	Jumpered Pins 1+2	5	RSYSCLK Selection: MCLK (default), BPCLK
JP03	TSYSCLK Selection	Jumpered Pins 1+2	5	TSYSCLK Selection: MCLK (default), BPCLK
JP04	TCLK Selection	Jumpered Pins 1.2	5	TCLK Selection: RCLK (default), MCLK
J02	DS26521 Testpoints	—	5	Testpoints for DS26521 Pins: TSER, RSER, TSSYNCIO, TSYNC, RSYNC, REFCLKIO, MCLK, RSIG, TSIG
JP05	SPI_CPOL bias	Not Jumpered	3	SPI_CPOL Selection: Pulldown, Pullup
JP06	SPI_CPHA bias	Not Jumpered	3	SPI_CPHA Selection: Pulldown, Pullup
JP07	SPI_SWAP bias	Not Jumpered	3	SPI_SWAP Selection: Pulldown, Pullup
JP08	SPI_SEL bias	Jumpered Pins 1+2	3	SPI_SEL Selection: Pulldown (default), Pullup
JP09	BTS bias	Jumpered Pins 2+3	3	BTS Selection: Pulldown, Pullup (default)
JP10	TXENABLE bias	Jumpered Pins 2+3	3	TXENABLE Selection: Pulldown, Pullup (default)
J04, J08	Network BNC	—	4	BNC for 75Ω Network Connection
JB02	Network RJ48	—	4	RJ48 Network Connection

## DS26521 INFORMATION

For more information about the DS26521, consult the DS26521 data sheet available on our website at [www.maxim-ic.com/DS26521](http://www.maxim-ic.com/DS26521). Software downloads are also available for this design kit.

## DS26521DK INFORMATION

For more information about the DS26521DK, including software downloads, consult the DS26521DK data sheet available on our website at [www.maxim-ic.com/DS26521DK](http://www.maxim-ic.com/DS26521DK).

## TECHNICAL SUPPORT

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

## SCHEMATICS

The DS26521DK schematics are featured in the following pages.

B 7 6 5 4 3 2 1

D

D

C

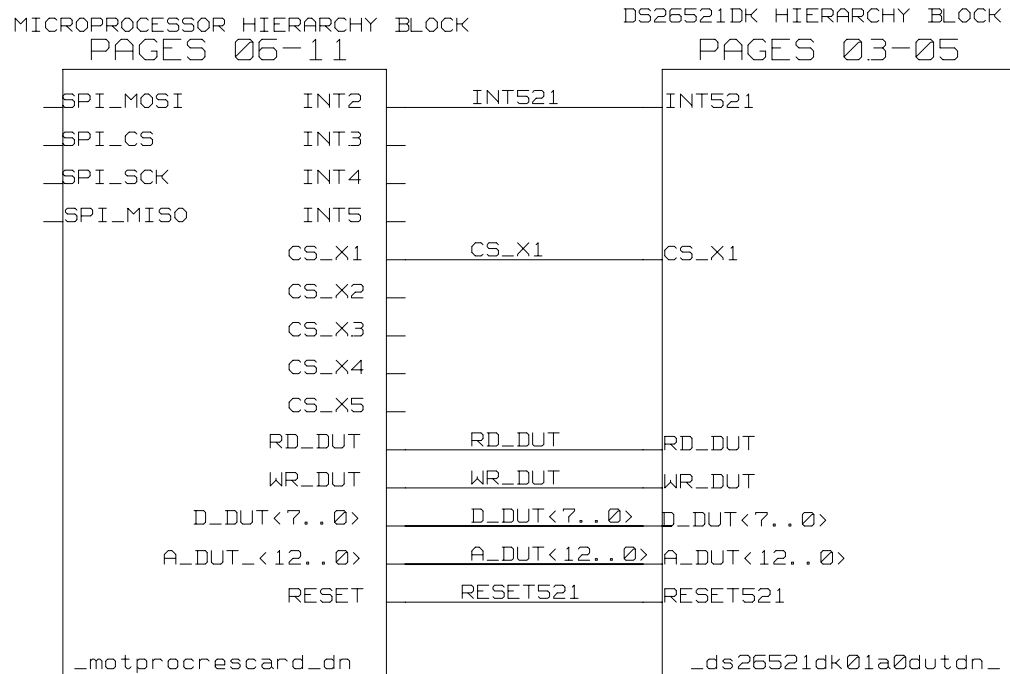
C

B

B

A

A



### CONTENTS

PAGE 01:	DS26521 DESIGN KIT AND ENGINEERING EVALUATION TOP LEVEL HIERARCHY BLOCKS
PAGE 02:	DECOUPLING / MOUNTING HOLES
DS26521 DESIGN KIT	
PAGES 03-05:	DS26521 DEVICE, LINE BUILDOUT AND TESTPOINTS
PAGES 06-11:	MICROPROCESSOR AND INTERFACE

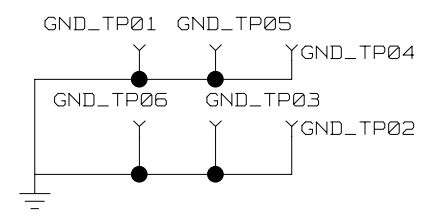
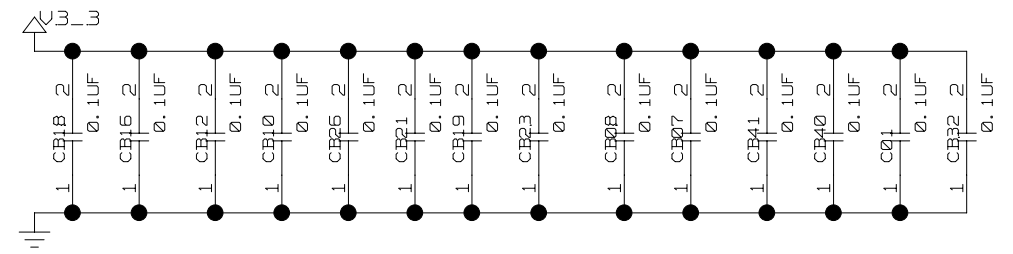
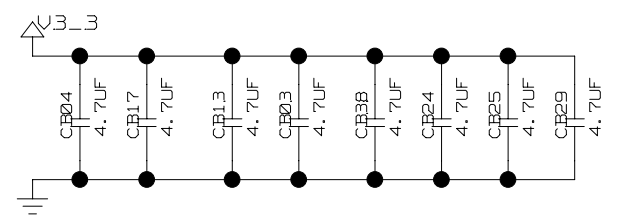
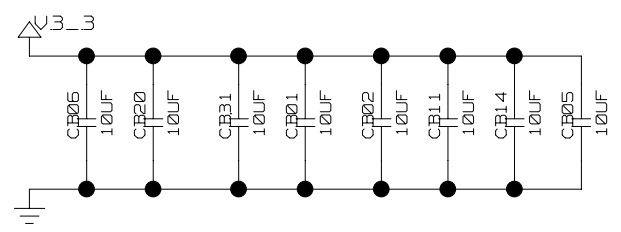
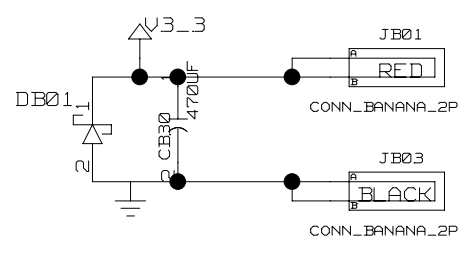
NOTES: EACH HIERARCHY BLOCK IS INDEPENDENT OF THE NEXT.  
 ONLY SIGNALS WITH IMPORT/OUTPORT CONNECTORS HAVE CONNECTION OUTSIDE THE HIERARCHY BLOCK. THESE SIGNALS APPEAR AS PINS ON THE HIERARCHY BLOCK CONNECTOR

TITLE: DS26521DK02A0	DATE: 10/26/2005
DS26521DK TOP LEVEL	
ENGINEER: STEVE SCULLY	PAGE: 1/2 (BLOCK) 1/11 (TOTAL)

B 7 6 5 4 3 2 1

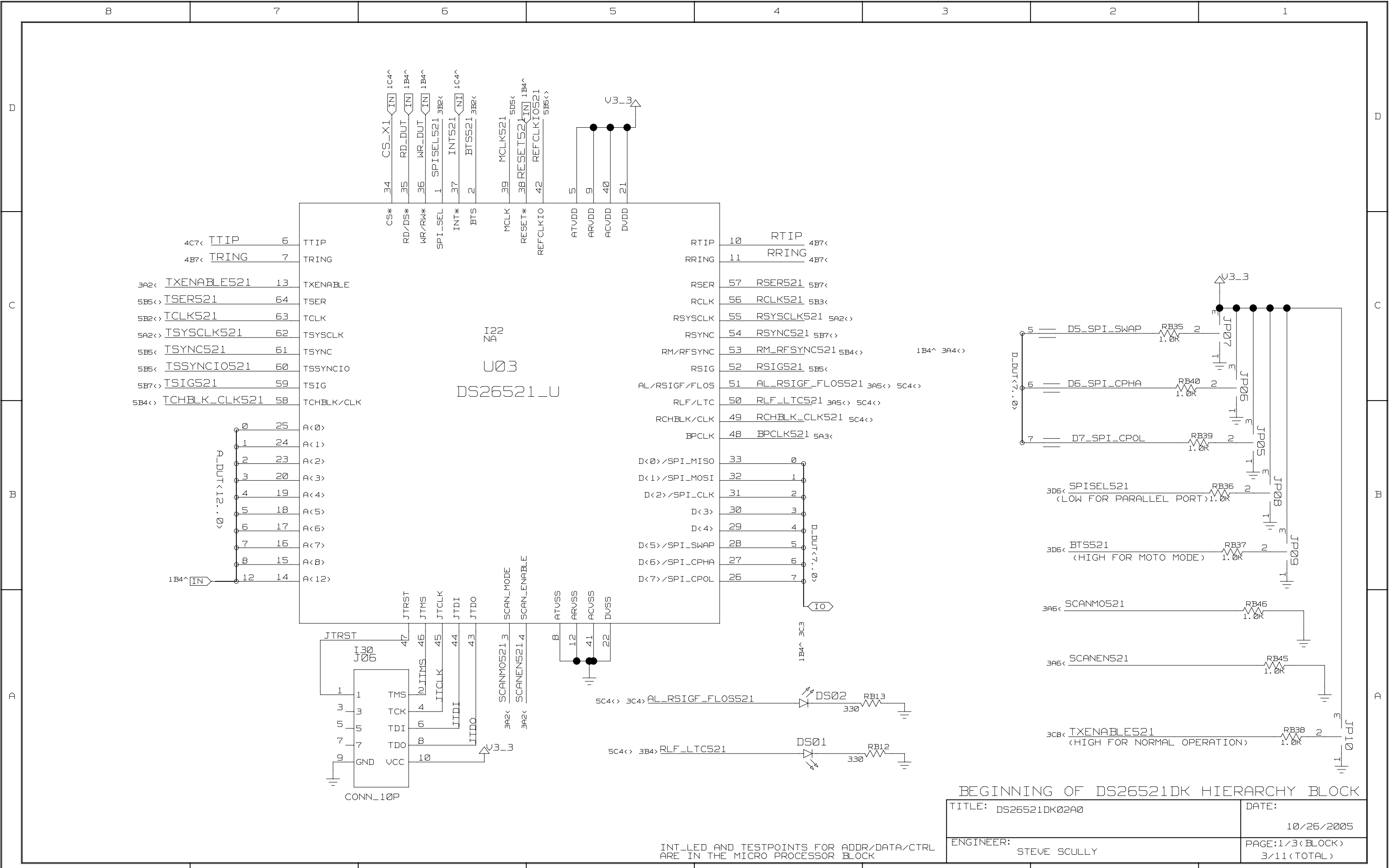


B 7 6 5 4 3 2 1



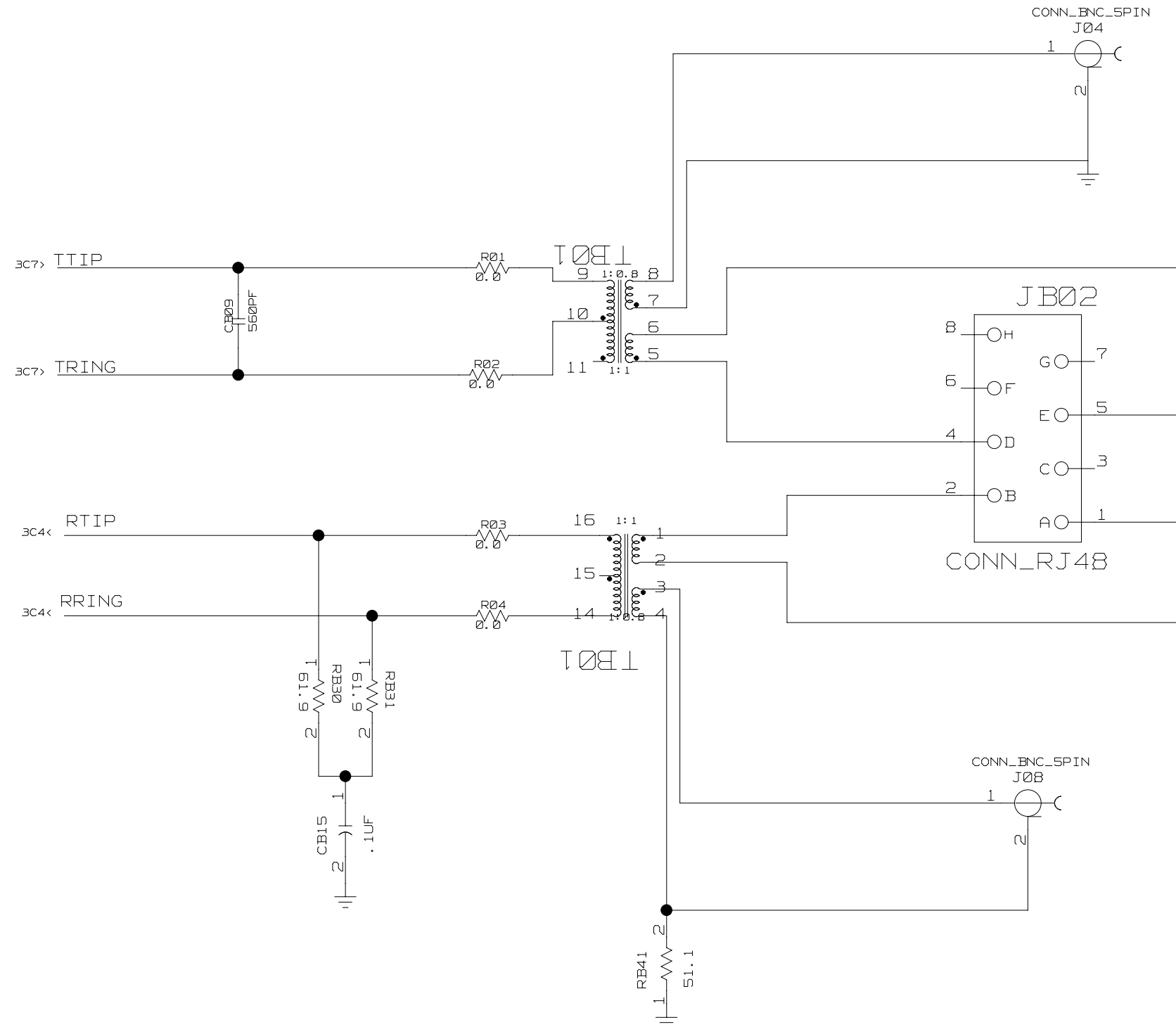
TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE:2/2 (BLOCK) 2/11 (TOTAL)

B 7 6 5 4 3 2 1

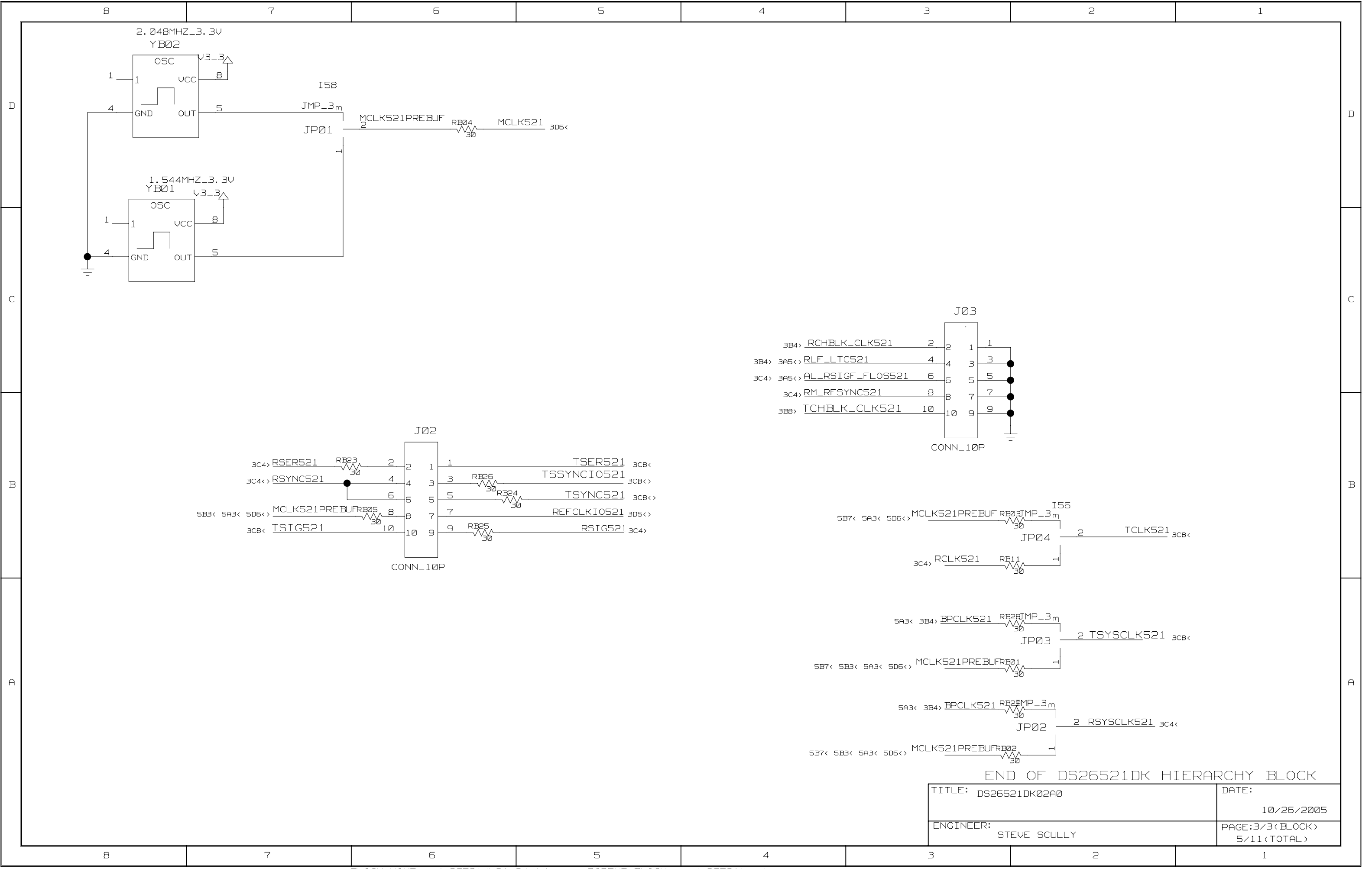


TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE: 1/3 (BLOCK) 3/11 (TOTAL)

INT\_LED AND TESTPOINTS FOR ADDR/DATA/CTRL ARE IN THE MICRO PROCESSOR BLOCK

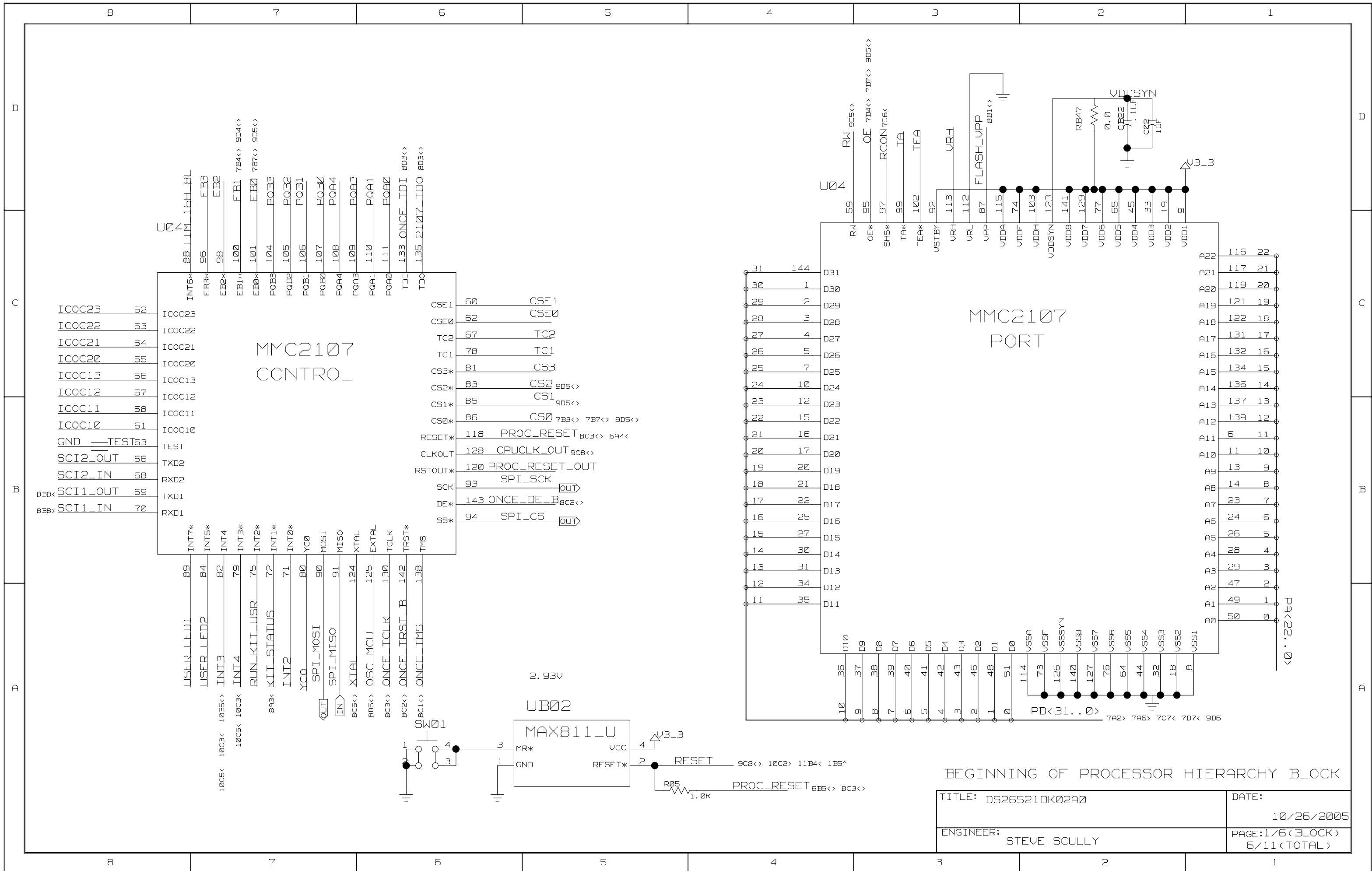


TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE:2/3 (BLOCK) 4/11 (TOTAL)



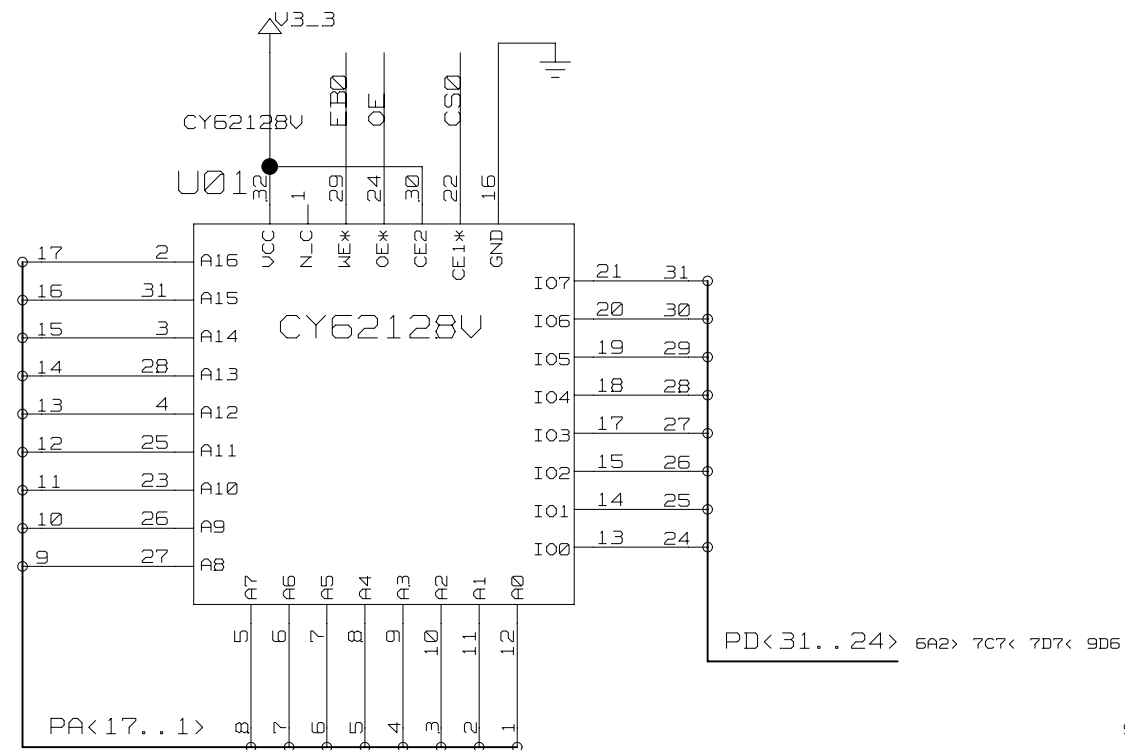
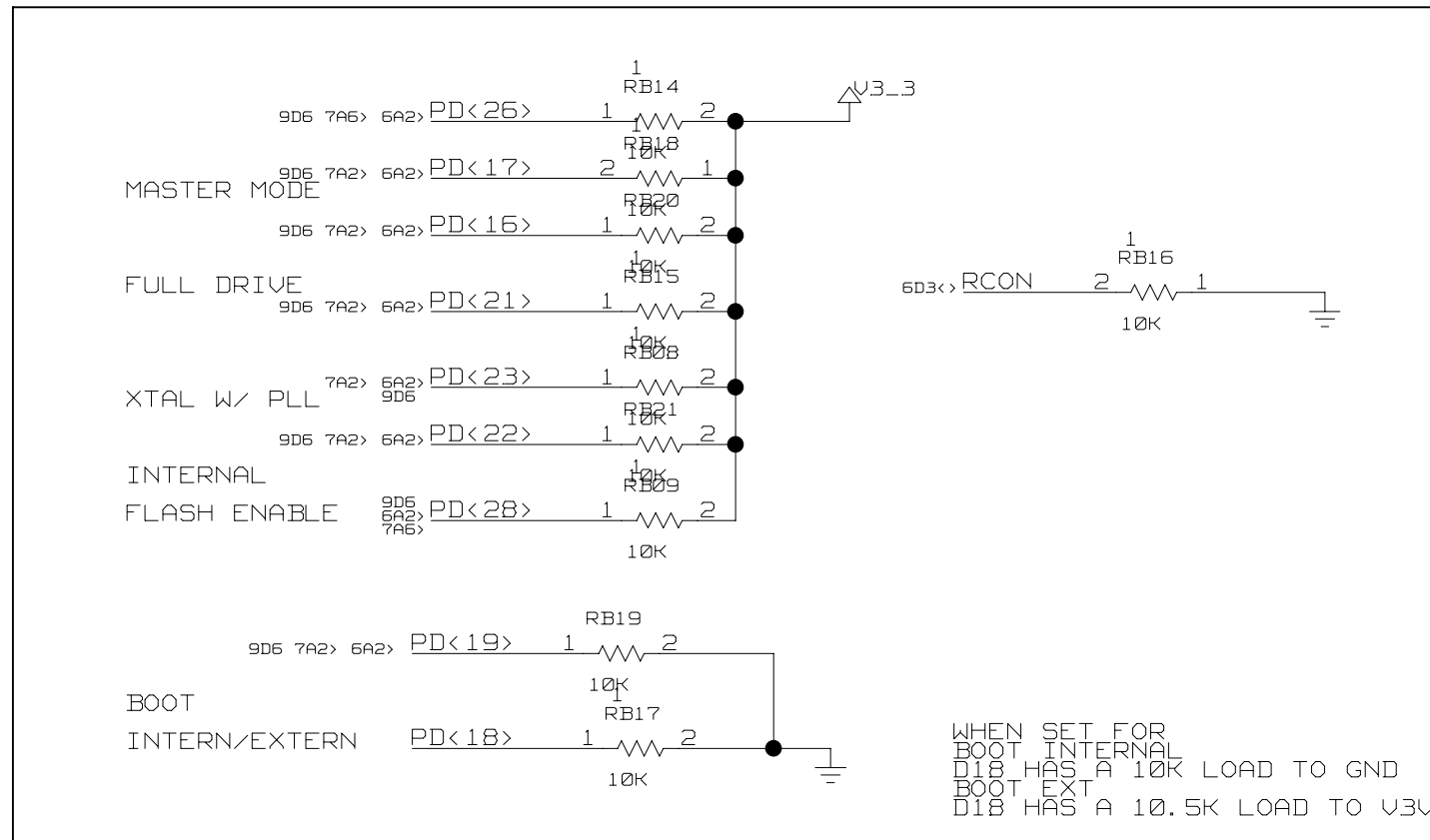
END OF DS26521DK HIERARCHY BLOCK

TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE: 3/3 (BLOCK) 5/11 (TOTAL)

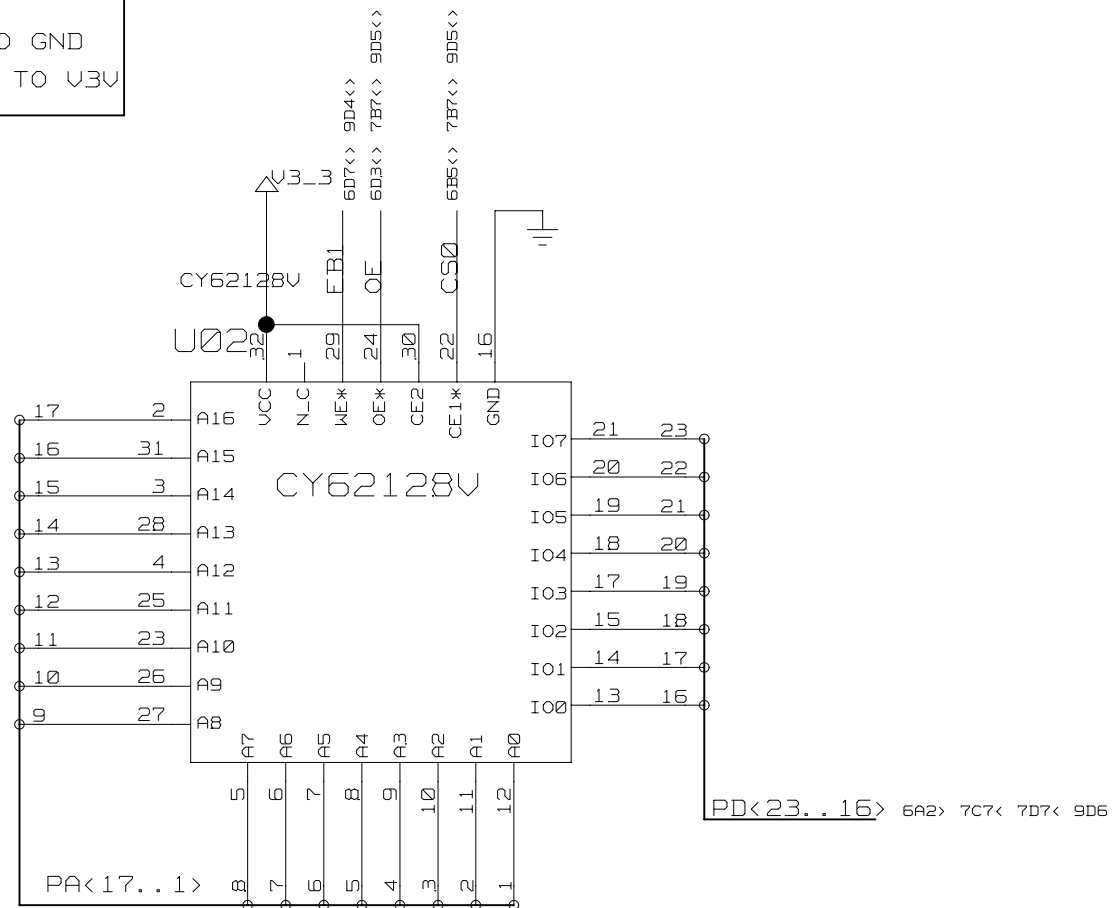


TITLE: DS26521DK02A0		DATE:
		10/26/2005
ENGINEER: STEVE SCULLY		PAGE: 1/6 (BLOCK) 6/11 (TOTAL)

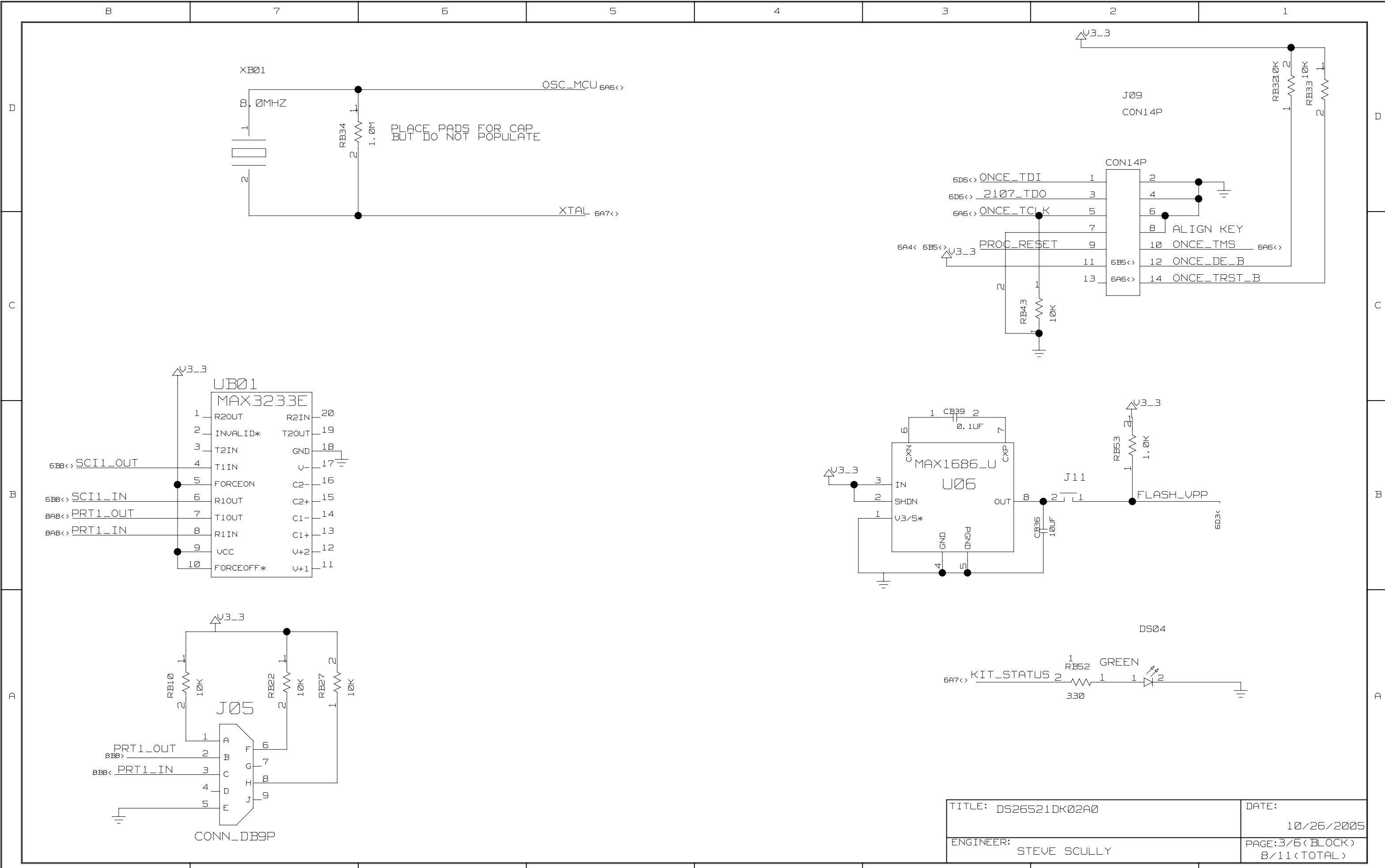
## RESET CONFIGURATION



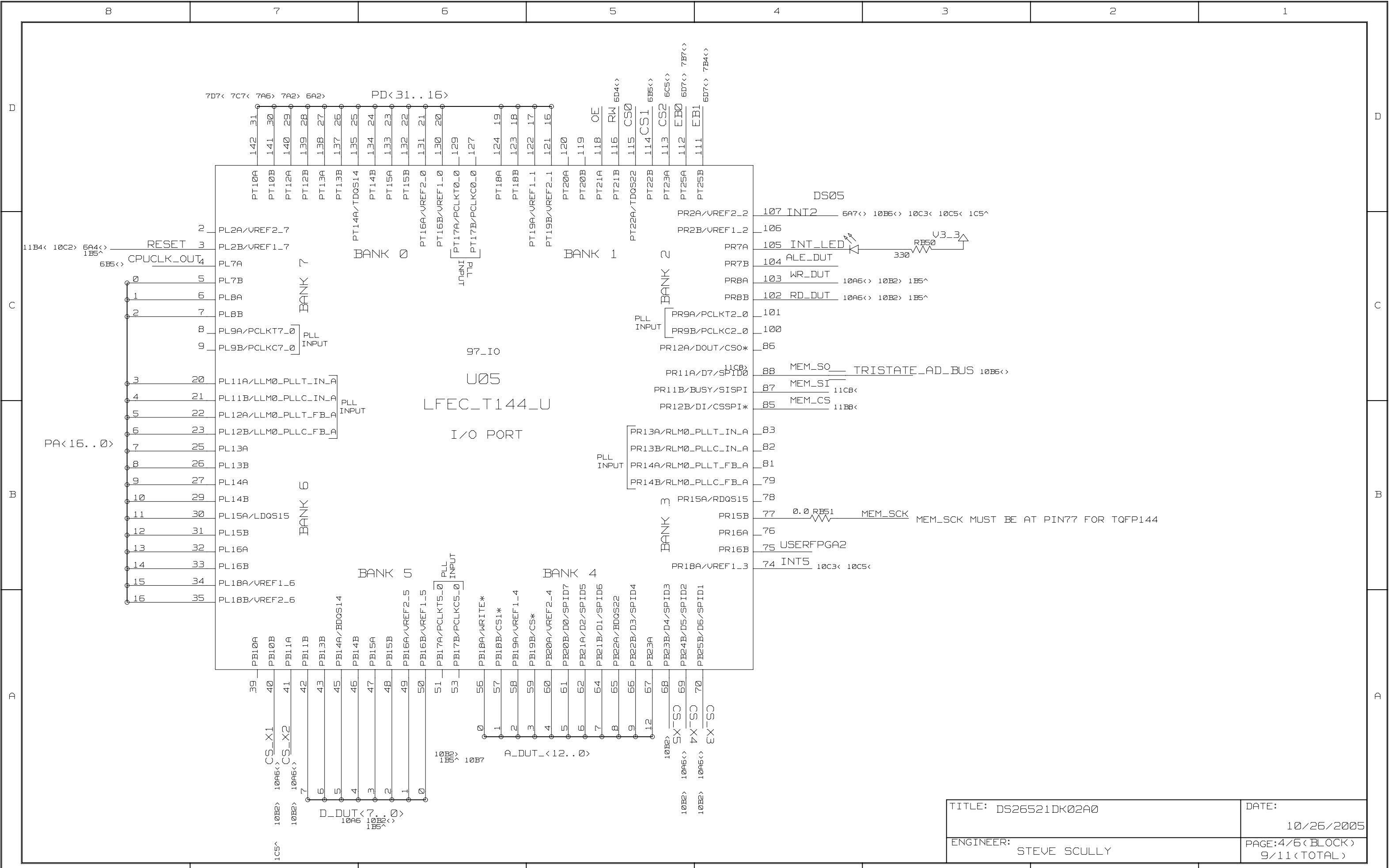
9BB 7AB 6A1>



TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE:2/6 (BLOCK) 7/11 (TOTAL)



TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE:3/6 (BLOCK) 8/11 (TOTAL)



TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE: 4/6 (BLOCK) 9/11 (TOTAL)



B 7 6 5 4 3 2 1

D

D

C

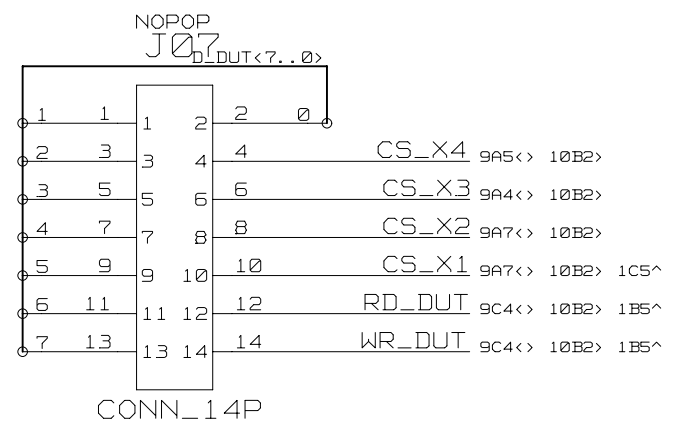
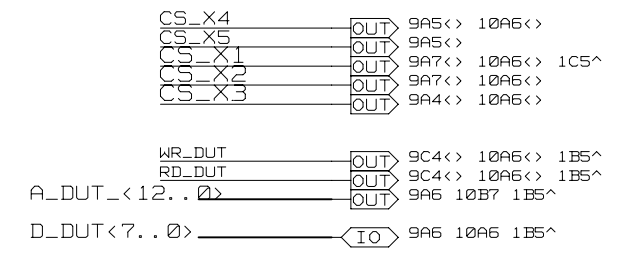
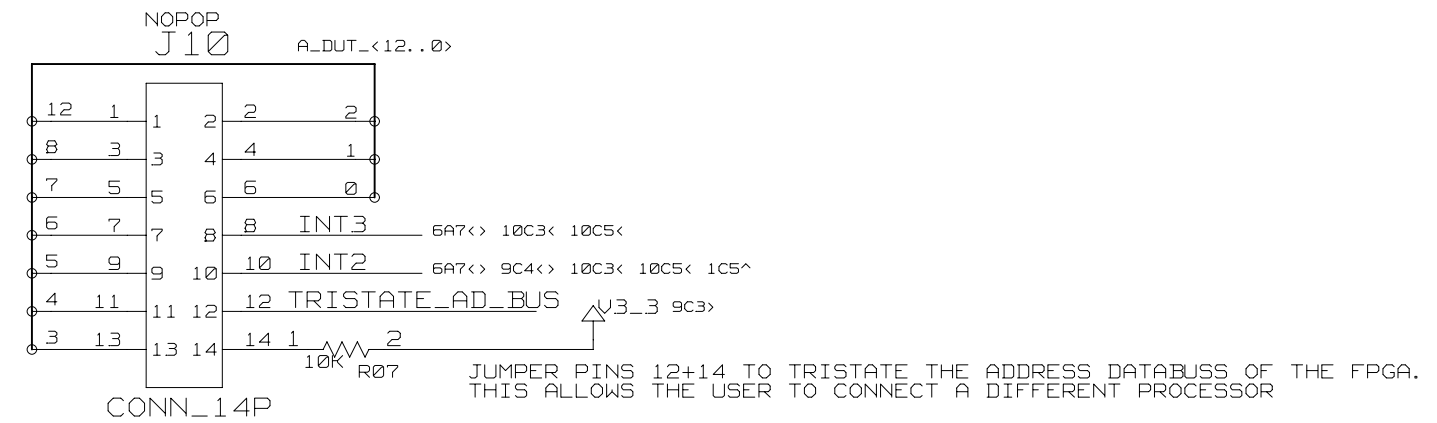
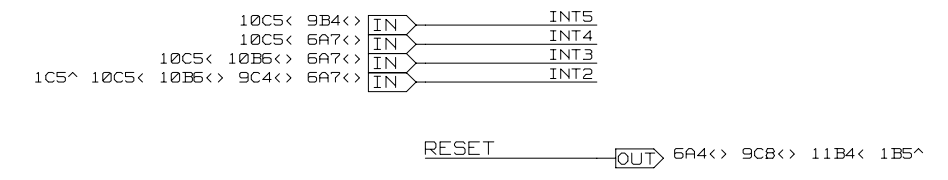
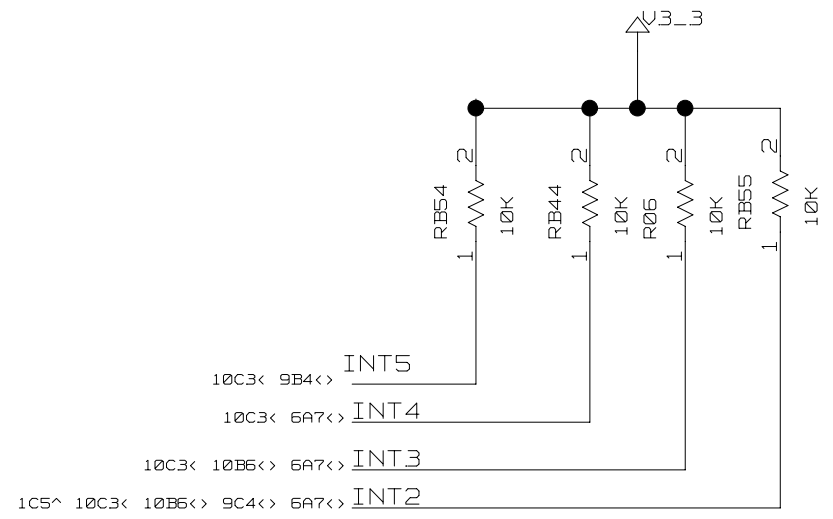
C

B

B

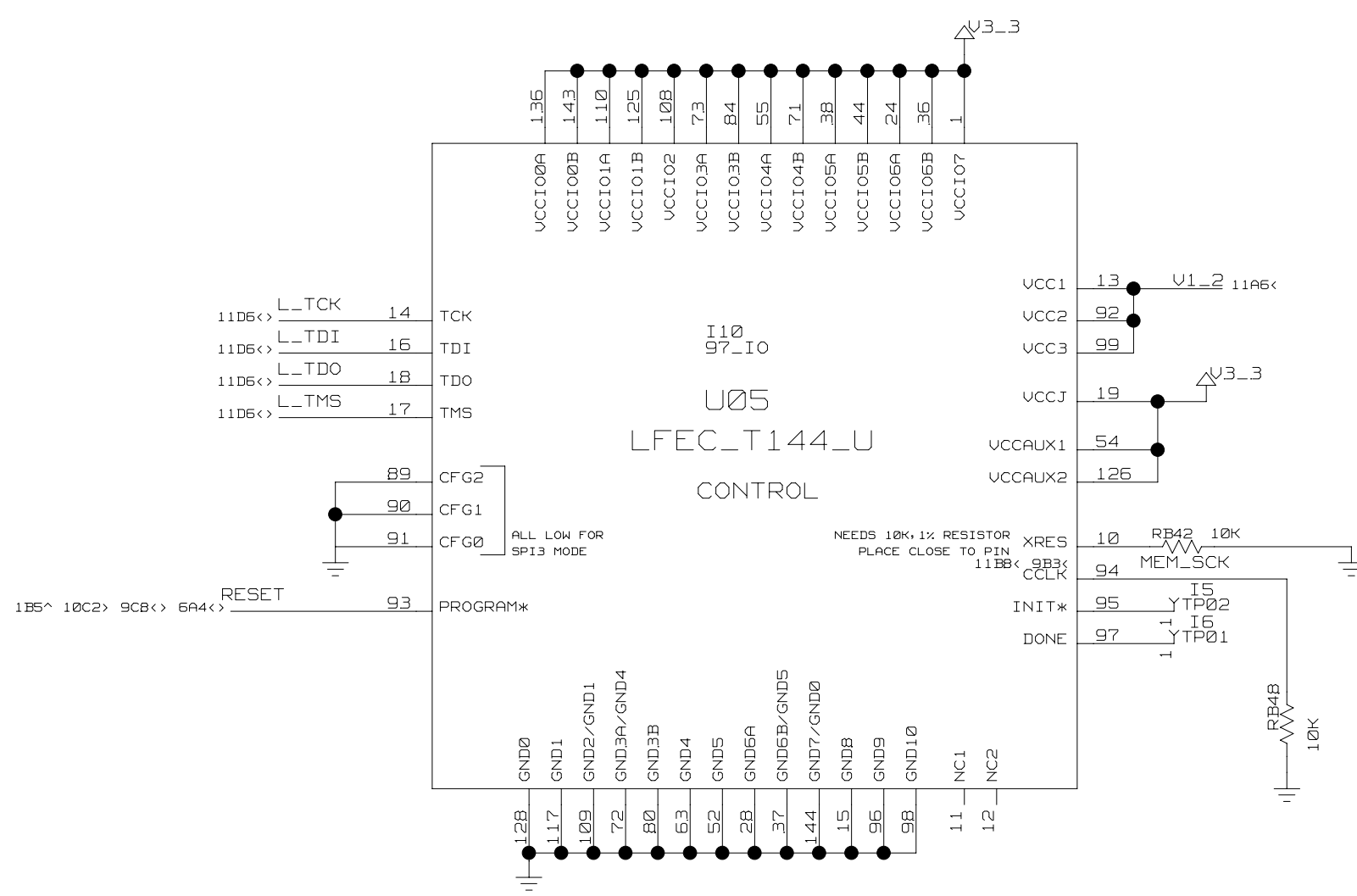
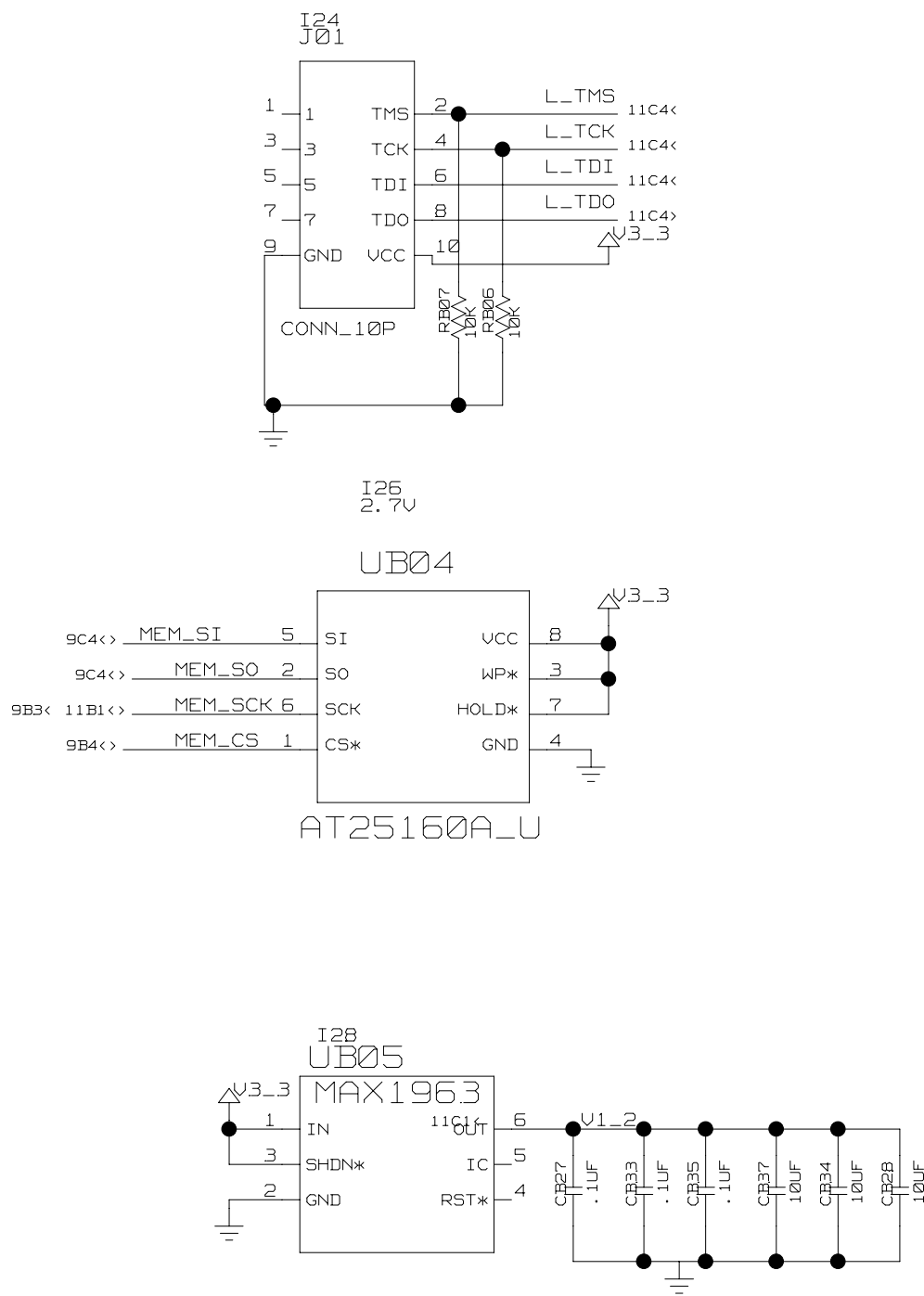
A

A



TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE:5/6 (BLOCK) 10/11 (TOTAL)

B 7 6 5 4 3 2 1



END OF PROCESSOR HIERARCHY BLOCK

TITLE: DS26521DK02A0	DATE: 10/26/2005
ENGINEER: STEVE SCULLY	PAGE: 6/6 (BLOCK) 11/11 (TOTAL)