

ECR	ECR NUMBER -----	DATE xx/xx/xx
-----	---------------------	------------------

NOTES:

1. PLACE NET NAMES ON ALL JUMPERS AND HEADERS.
2. PLACE ALL PARTS OTHER THAN SMP CONNECTORS ON A 0 OR 90 DEGREE ORIENTATION.
3. SERIAL DATA SHOULD BE ROUTED AS SINGLE-ENDED 50 OHM TRANSMISSION LINES ON OUTSIDE LAYERS. ROUTING DISTANCE SHOULD BE 3 INCHES OR LESS.
4. USE ROGERS MATERIAL FOR OUTSIDE LAYERS AND FR4-370 MATERIAL FOR INSIDE LAYERS.
5. SERIAL AND REFCLK NETS MUST MATCH WITHIN +/- 0.5 MILS
6. MATCH DIFFERENTIAL TRACE WIDTHS OF SERIAL AND REFCLK LINES WITH SMP/SMA PADS.

## SCHEMATIC SHEET INDEX:

- SHEET 01: TLK10232 REFERENCE DESIGN COVER SHEET AND NOTES
- SHEET 02: 1P0V REGULATORS
- SHEET 03: 1P5V, 1P8V, 2P5V, 3P3V REGULATORS
- SHEET 04: POWER DISTRIBUTION
- SHEET 05: VOLTAGE MONITORING
- SHEET 06: DEVICE POWER AND GROUND
- SHEET 07: GLOBAL SIGNALS
- SHEET 08: MDIO, JTAG, AND I2C INTERFACE
- SHEET 09: CLOCKS
- SHEET 10: CLOCK CONTROL
- SHEET 11: CRYSTAL OSCILLATORS
- SHEET 12: LOW SPEED DATA SIGNALS
- SHEET 13: HIGH SPEED DATA SIGNALS
- SHEET 14: DATA BOARD TO BOARD CONNECTOR
- SHEET 15: CLOCK BOARD TO BOARD CONNECTOR



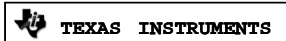
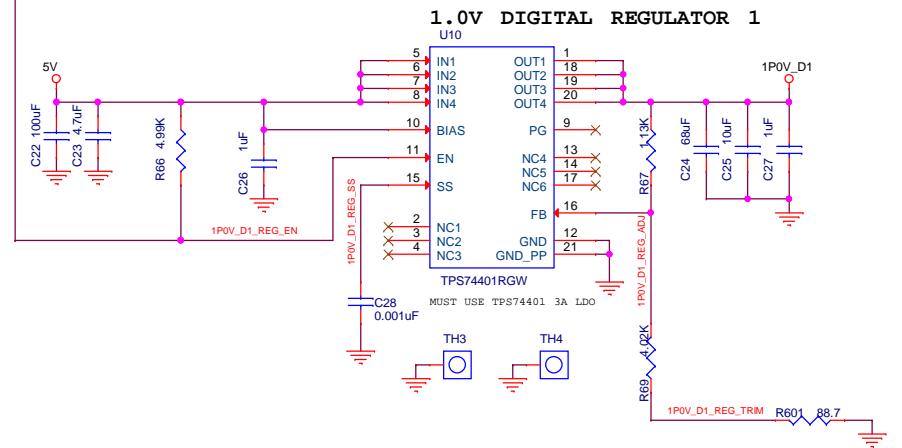
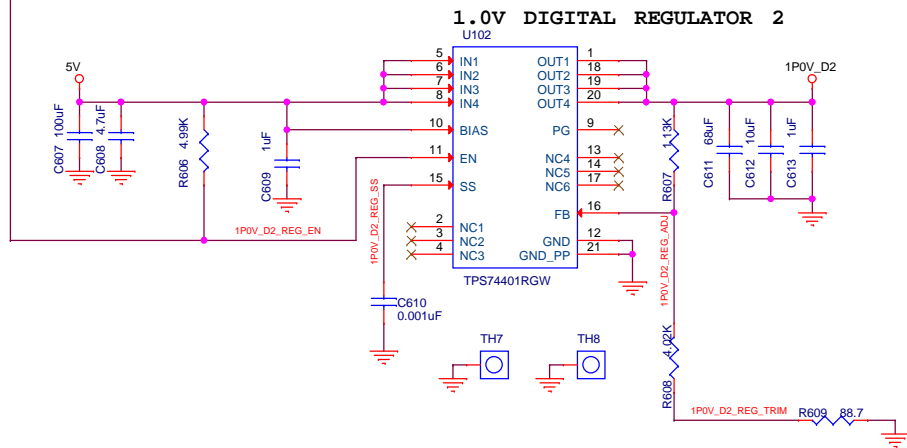
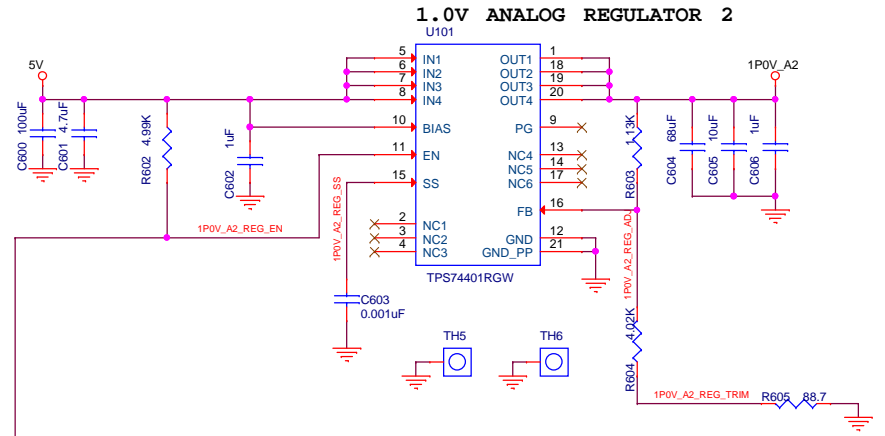
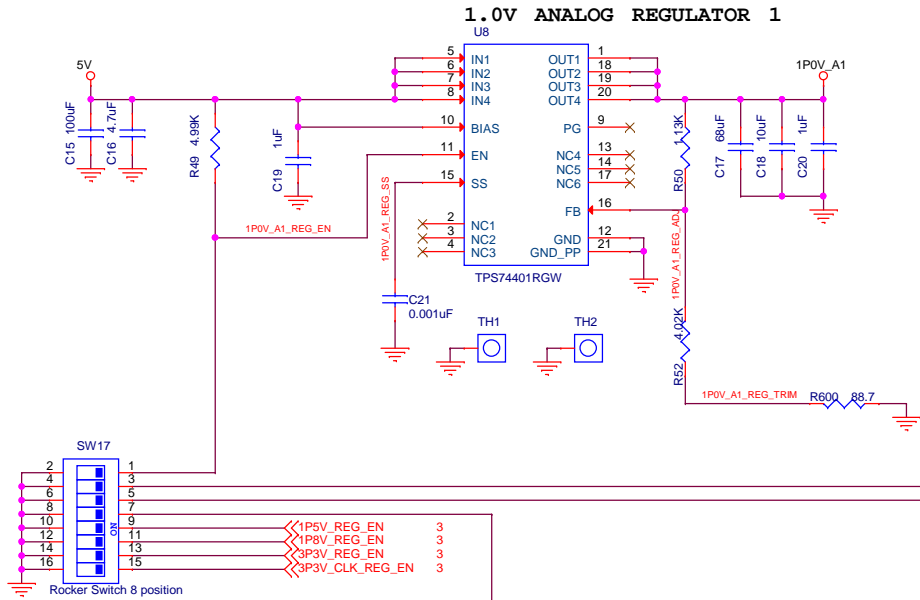
### TEXAS INSTRUMENTS

**SCHEMATIC TITLE**  
TLK10232 EVM MOTHER BOARD

ENGINEER	DATE
J. NERGER	05/23/13
LAYOUT	DATE
DFW TEST	05/23/13
RELEASED	DATE
J. NERGER	05/23/13

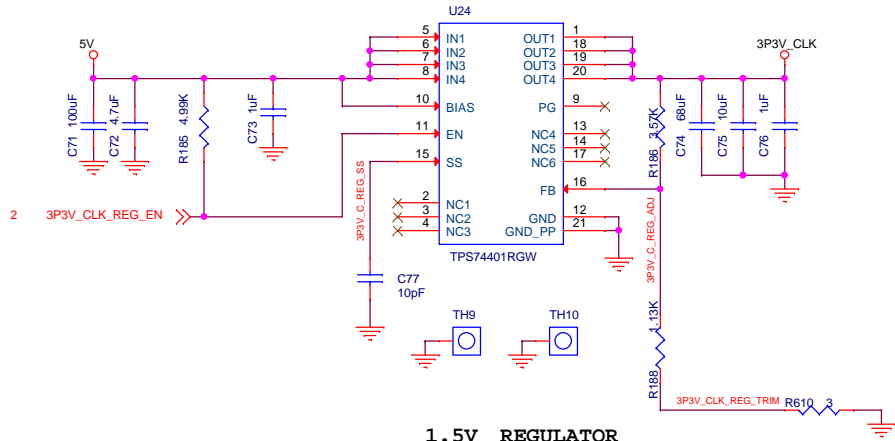
**PAGE TITLE**  
COVER PAGE AND NOTES

SIZE	DOCUMENT NUMBER	REV	SHEET
B	6566789	B	1 of 15

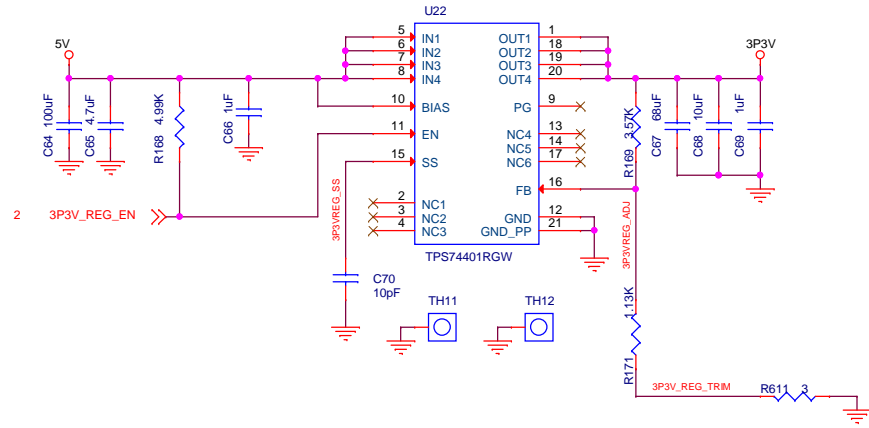


PAGE TITLE			
1P0V REGULATORS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	2 of 15

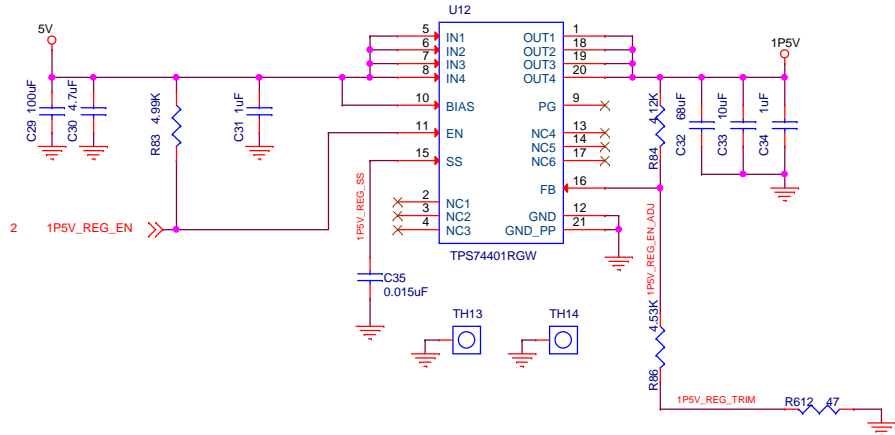
### 3.3V CLK REGULATOR



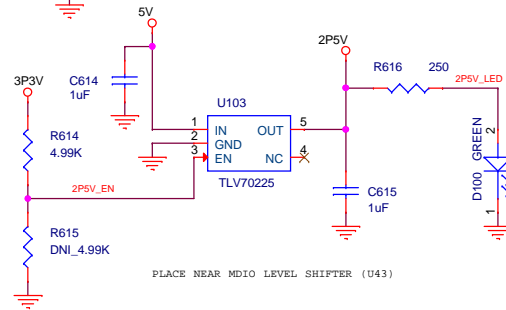
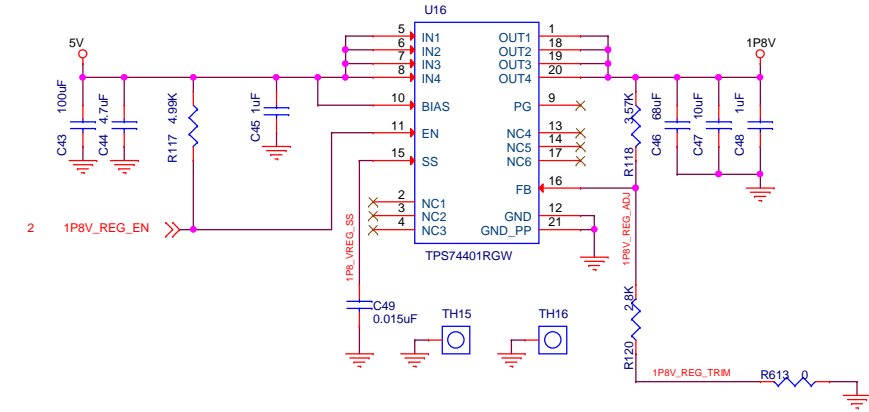
### 3.3V REGULATOR



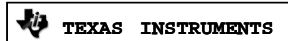
### 1.5V REGULATOR



### 1.8V REGULATOR

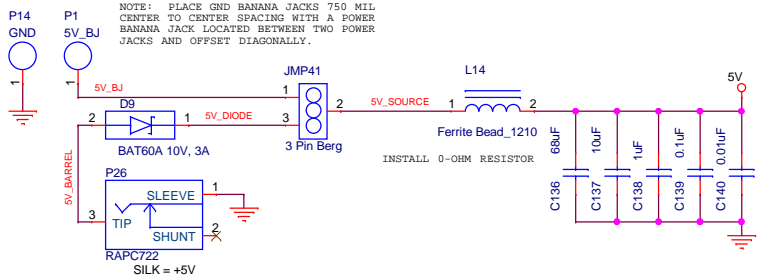
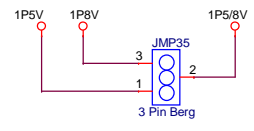
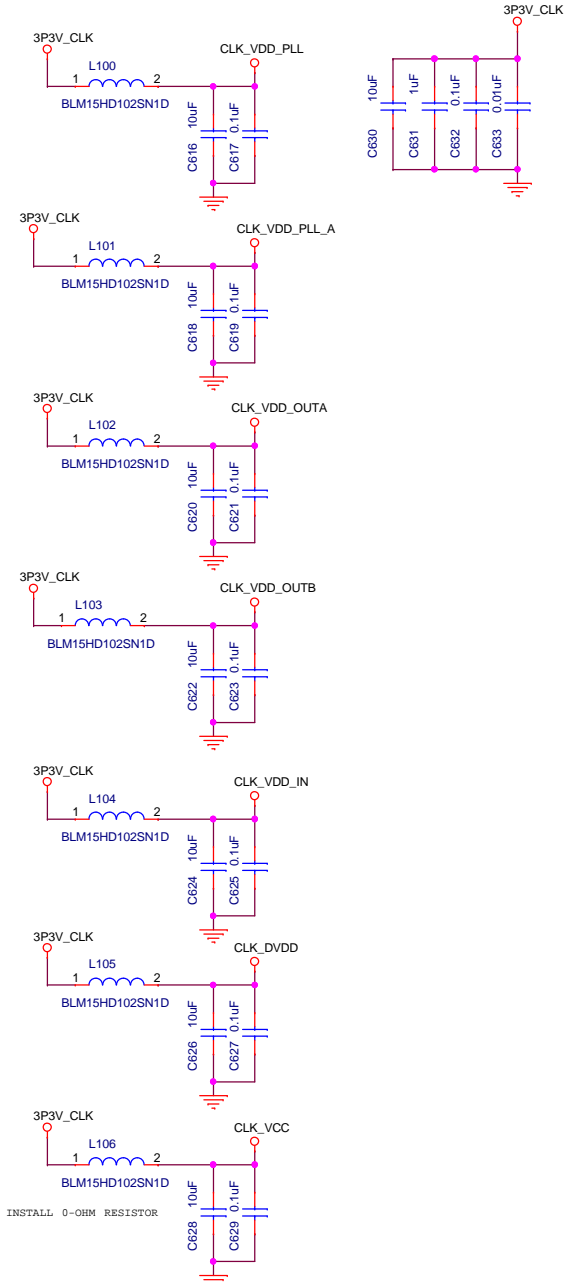


PLACE NEAR MDIO LEVEL SHIFTER (U43)

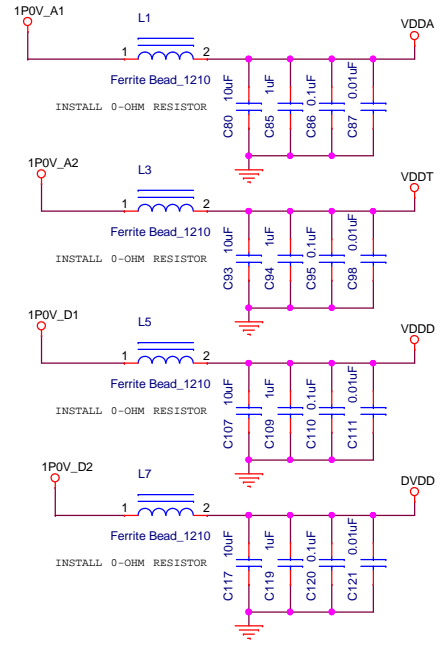
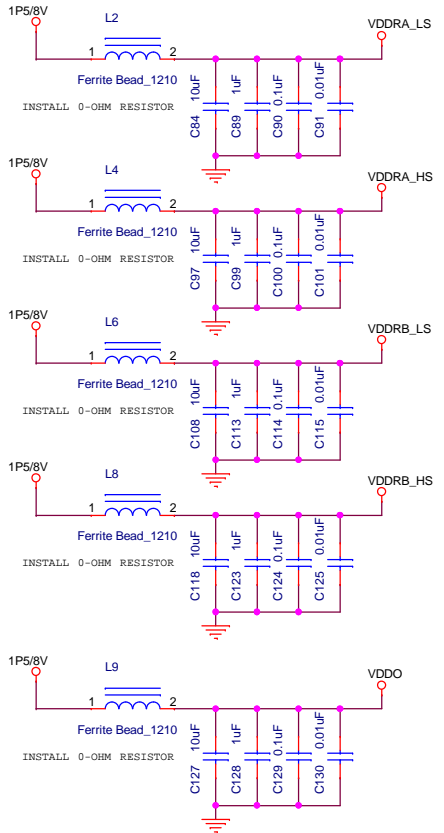


PAGE TITLE			
1P5V, 1P8V, 2P5V, 3P3V REGULATORS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	3 of 15

# PLANE FILTERING / BULK DECOUPLING

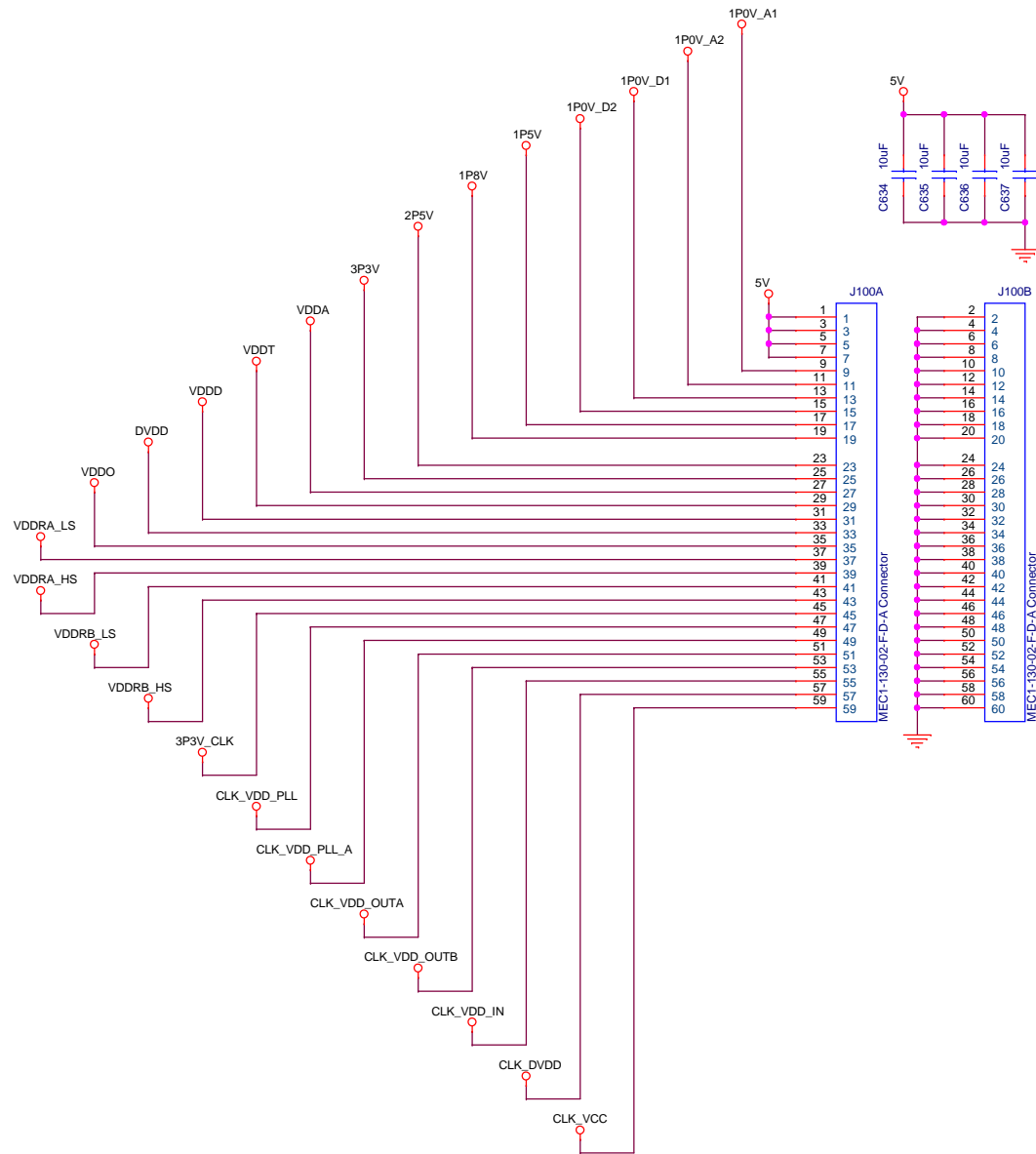


NOTE: PLACE GND BANANA JACKS 750 MIL CENTER TO CENTER SPACING WITH A POWER BANANA JACK LOCATED BETWEEN TWO POWER JACKS AND OFFSET DIAGONALLY.



PAGE TITLE			
POWER DISTRIBUTION			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	4 of 15

NOTE:



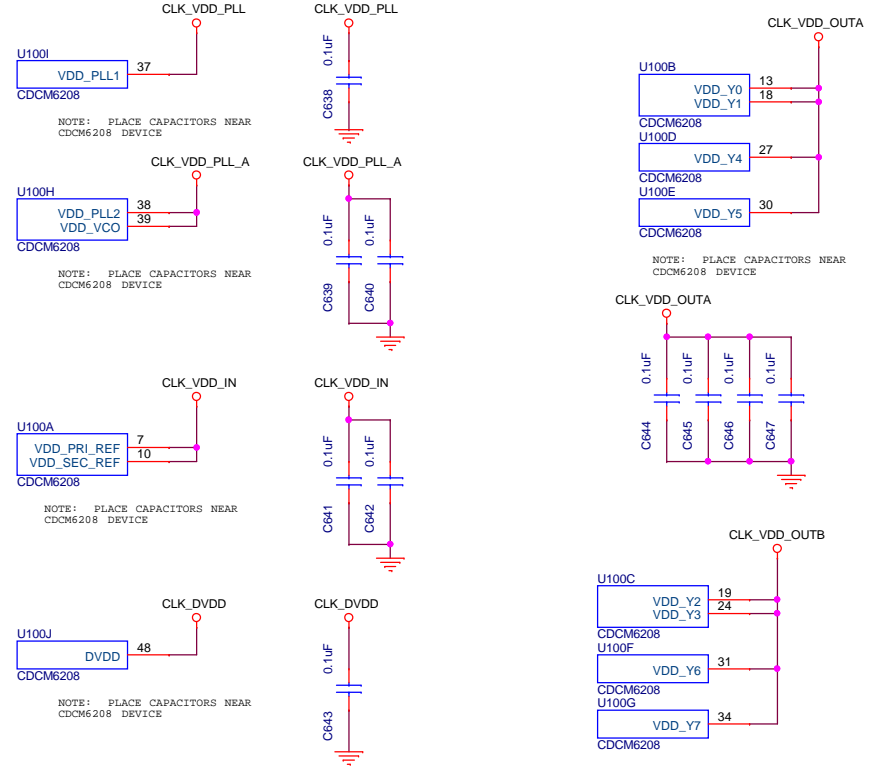
NOTE:  
PLACE DECOUPLING CAPS NEAR J100 CONNECTOR



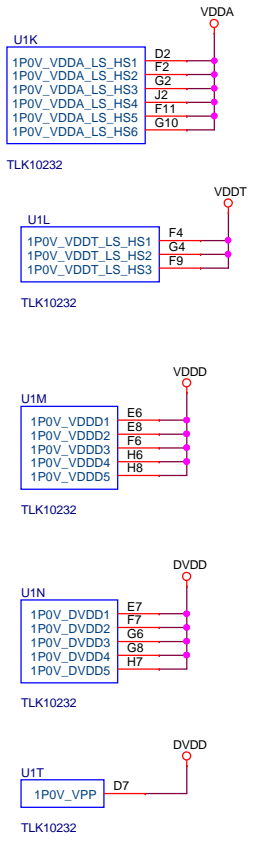
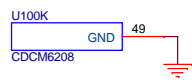
PAGE TITLE			
VOLTAGE MONITORING			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	5 of 15

NOTES:  
 DECOUPLING GENERAL GUIDELINES:  
 1. PLACE CAPACITORS SUCH THAT SMALLER VALUE CAPACITORS ARE NEARER THE DUT AND THEN SUCCESSIVELY PLACE LARGER VALUE CAPACITORS AS YOU MOVE AWAY FROM THE DUT.  
 2. PLACE CAPACITORS NEAR VIAS AND CONNECTORS. THESE CAPACITORS SHOULD DECOUPLE THE DRIVER SUPPLY TO THE GROUND PLANE. IF A SIGNAL IS REFERENCED TO A POWER PLANE AND THIS POWER PLANE IS NOT ASSOCIATED WITH THE DRIVER SUPPLY, THEN THIS PLANE SHOULD ALSO BE DECOUPLED TO GROUND NEAR ALL ASSOCIATED VIAS AND CONNECTORS.

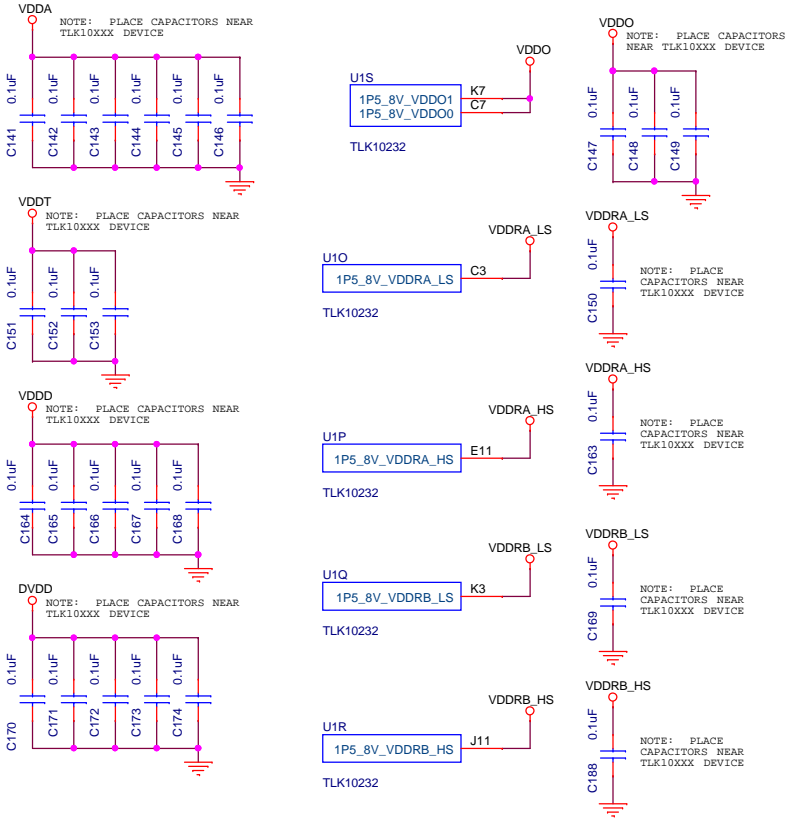
### CDCM6208 DEVICE POWER / LOCAL DECOUPLING



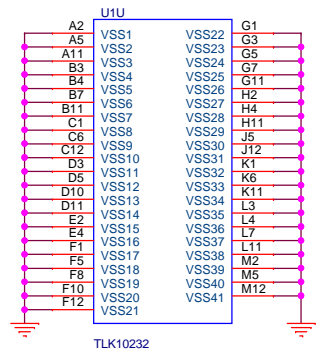
### CDCM6208 DEVICE GROUND

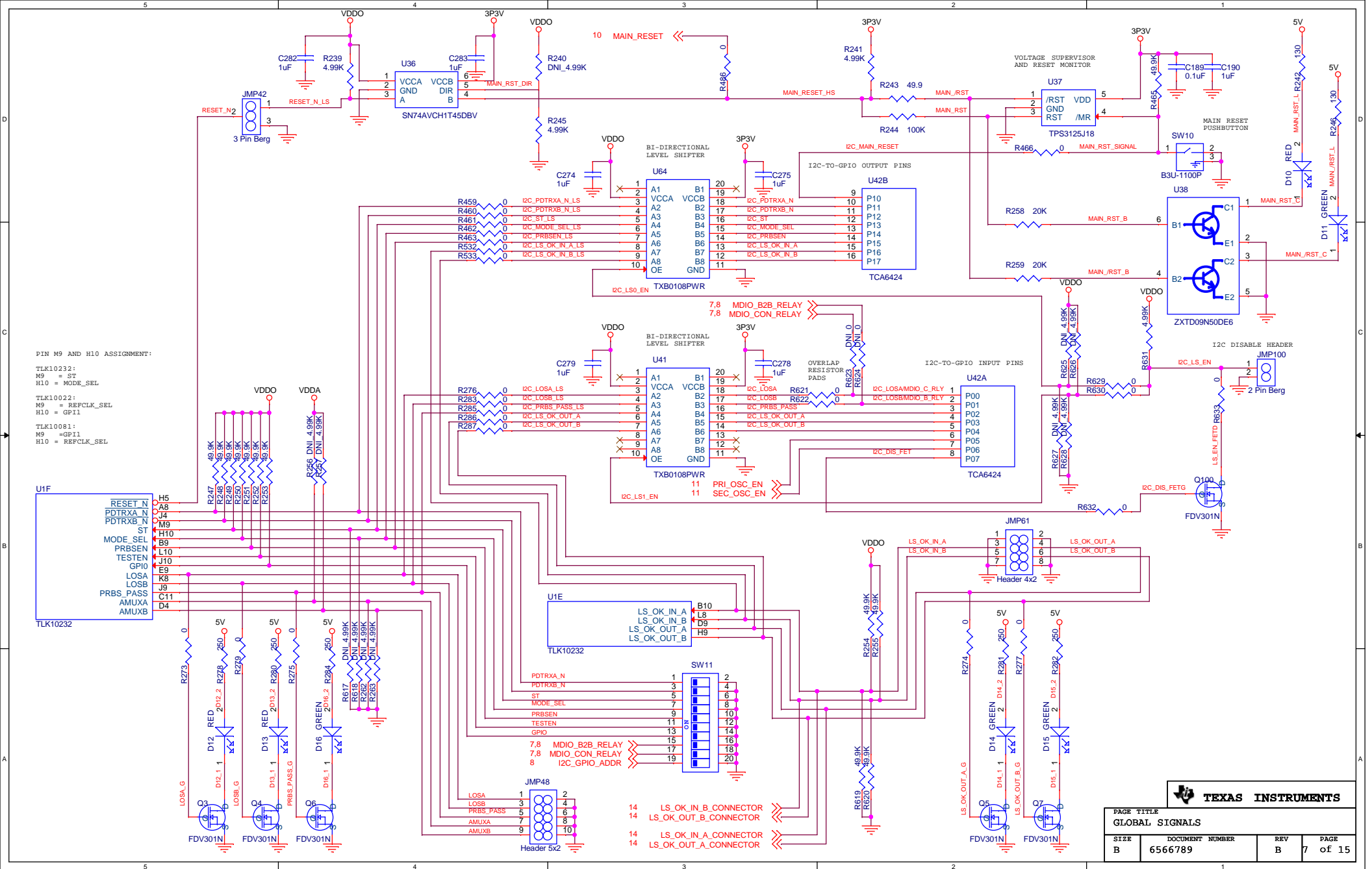


### TLK10XXX DEVICE POWER / LOCAL DECOUPLING

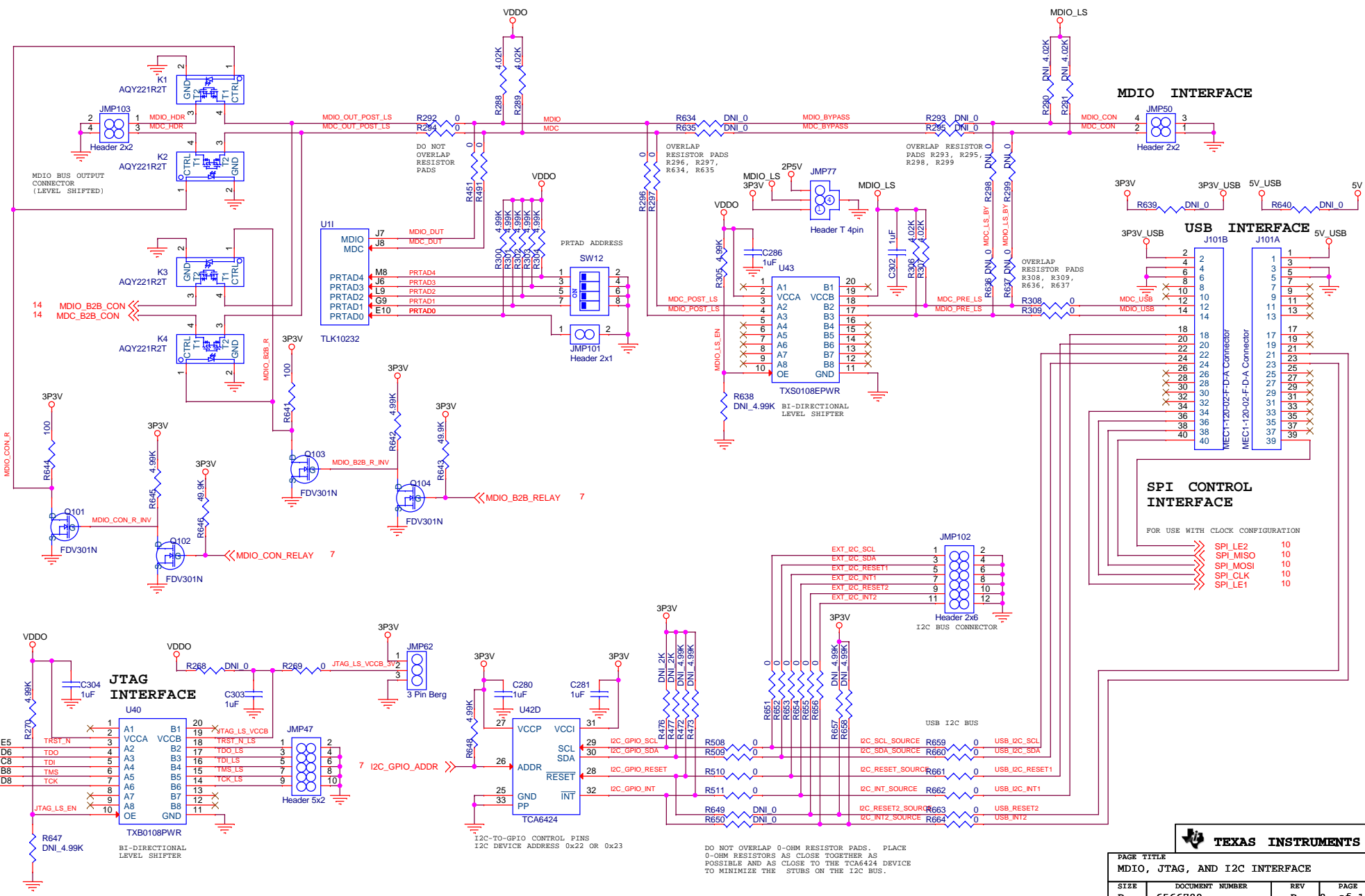


### TLK10XXX DEVICE GROUND





PAGE TITLE			
GLOBAL SIGNALS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	7 of 15

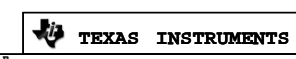


**MDIO INTERFACE**

**USB INTERFACE**

**SPI CONTROL INTERFACE**

- FOR USE WITH CLOCK CONFIGURATION
- SPI\_LE2 10
  - SPI\_MISO 10
  - SPI\_MOSI 10
  - SPI\_CLK 10
  - SPI\_LE1 10



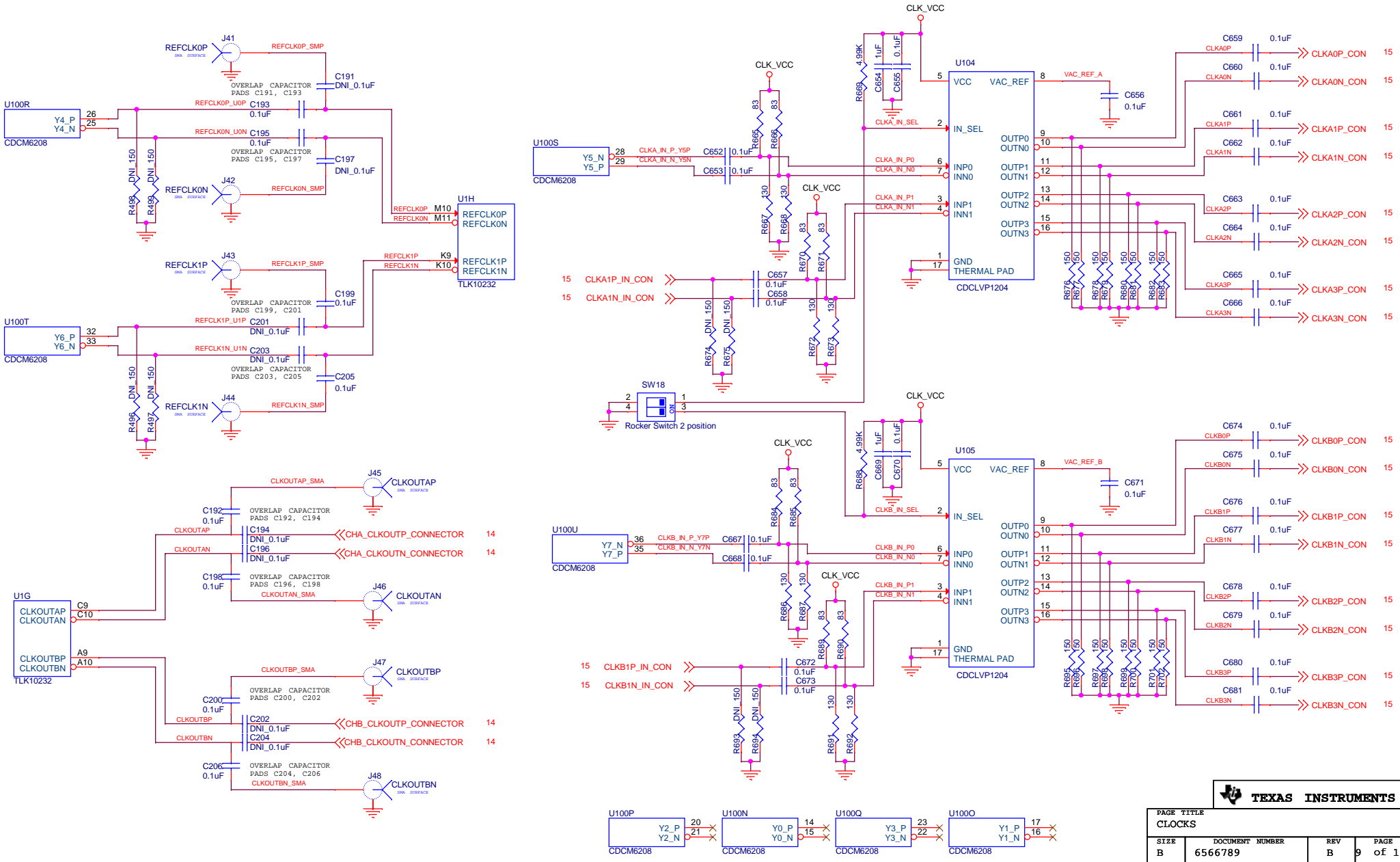
PAGE TITLE			
MDIO, JTAG, AND I2C INTERFACE			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	8 of 15

DO NOT OVERLAP 0-OHM RESISTOR PADS. PLACE 0-OHM RESISTORS AS CLOSE TOGETHER AS POSSIBLE AND AS CLOSE TO THE TCA6424 DEVICE TO MINIMIZE THE STUBS ON THE I2C BUS.

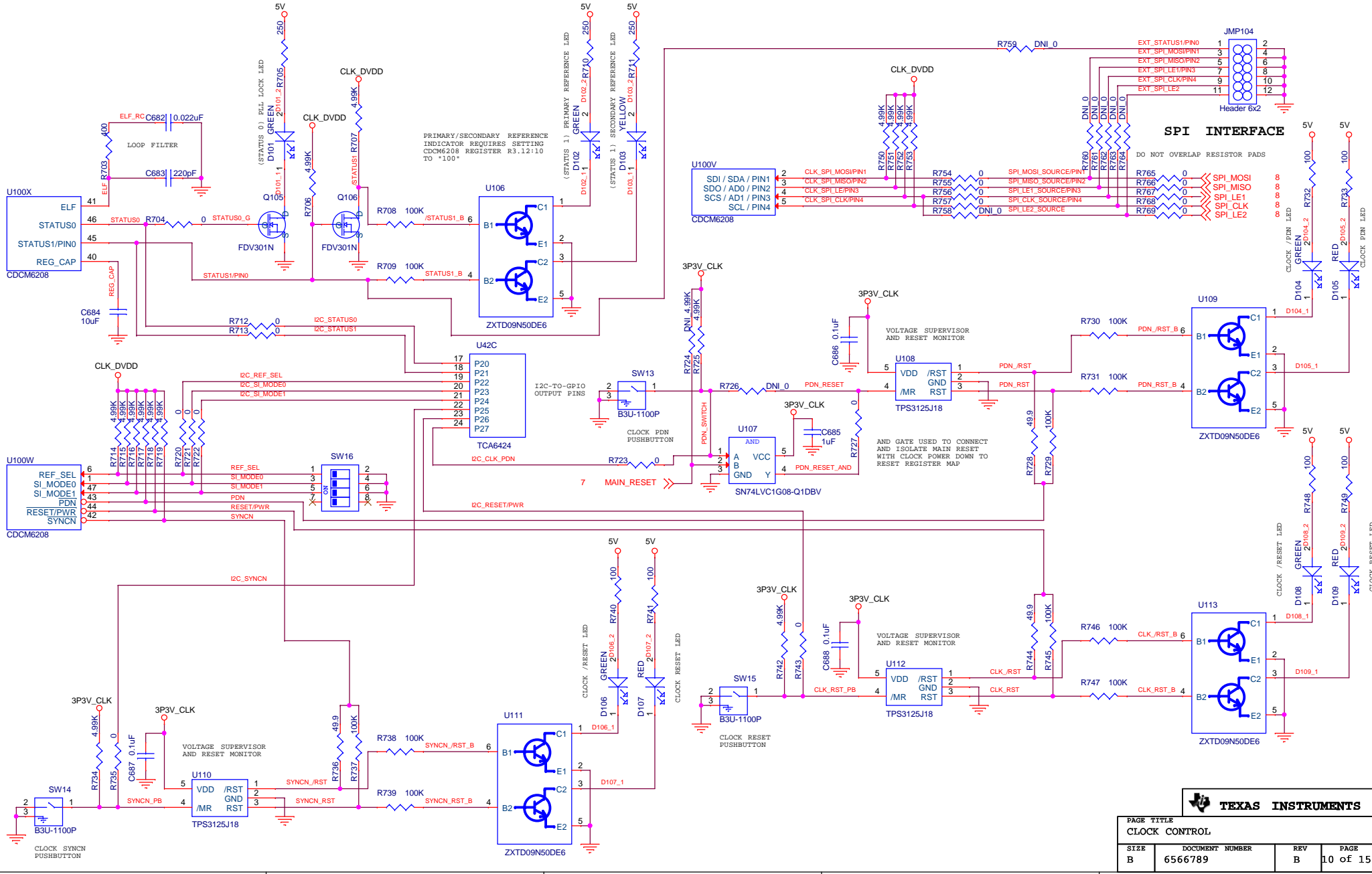
I2C-TO-GPIO CONTROL PINS  
I2C DEVICE ADDRESS 0x22 OR 0x23



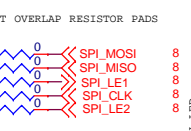
NOTE: 1. MATCH REFCLK0/1\_P/N AND CLKOUT0/1\_P/N TRACE LENGTHS TO EACHOTHER



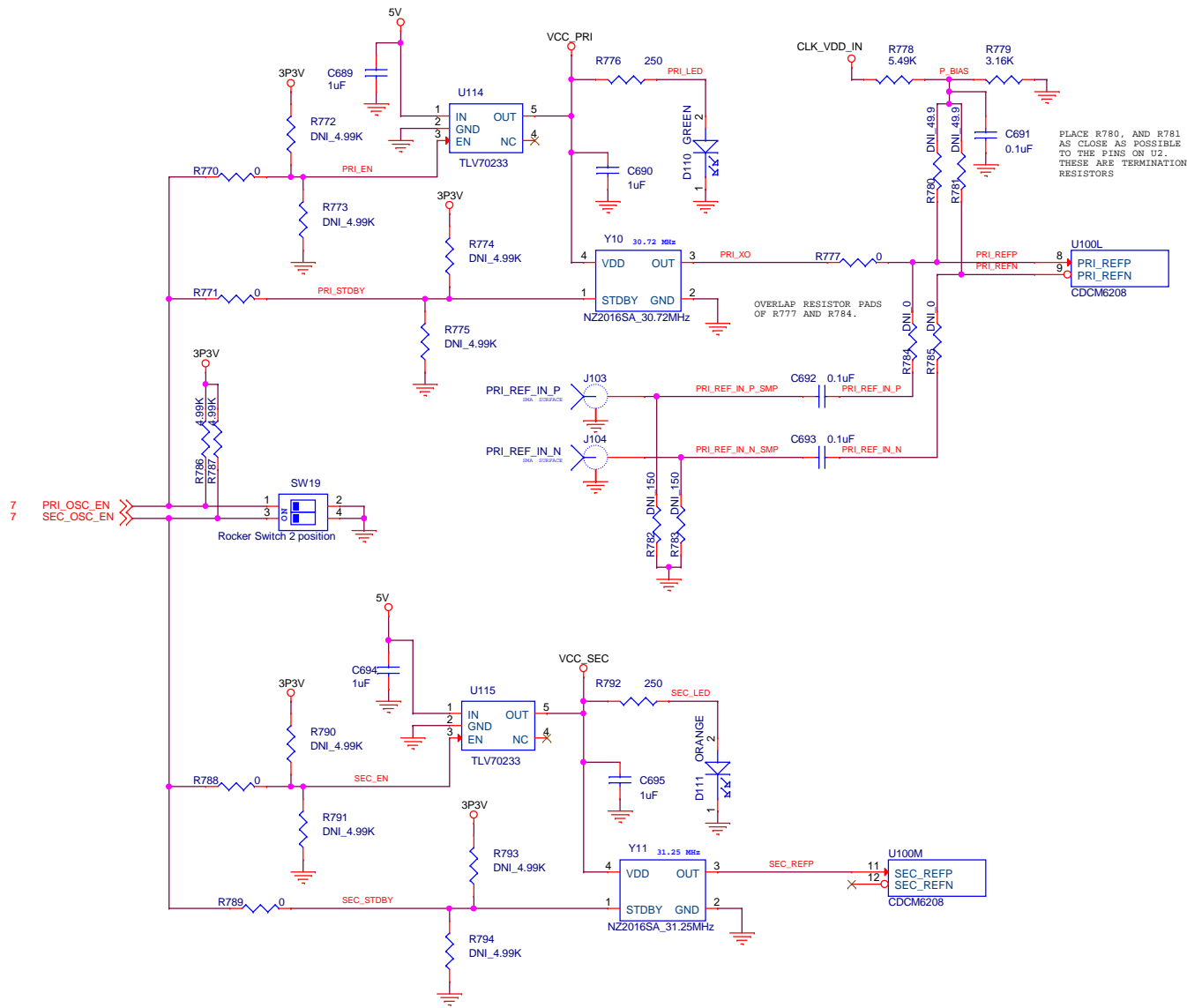
PAGE TITLE			
CLOCKS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	9 of 15



**SPI INTERFACE**



NOTE:



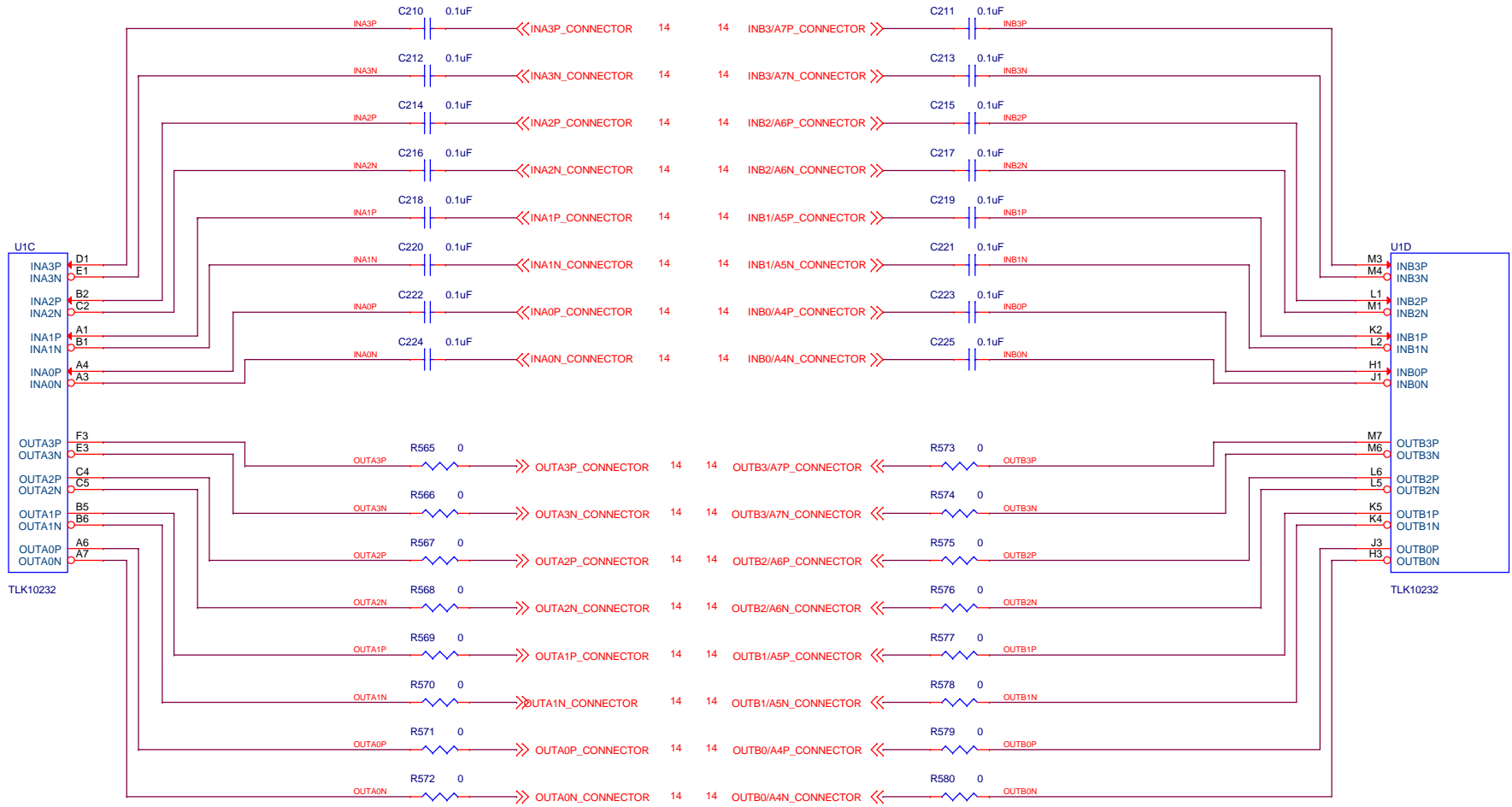
PLACE R780, AND R781  
AS CLOSE AS POSSIBLE  
TO THE PINS ON U2.  
THESE ARE TERMINATION  
RESISTORS

OVERLAP RESISTOR PADS  
OF R777 AND R784.

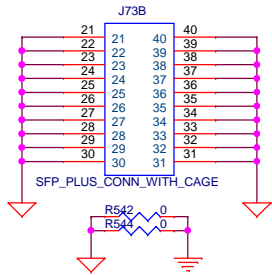


PAGE TITLE			
CRYSTAL OSCILLATORS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	11 of 15

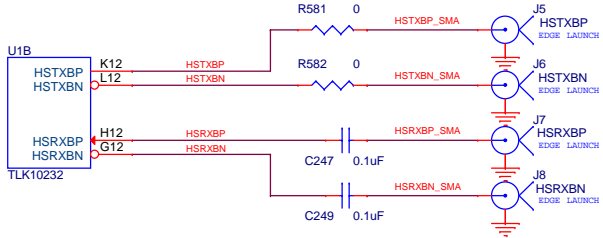
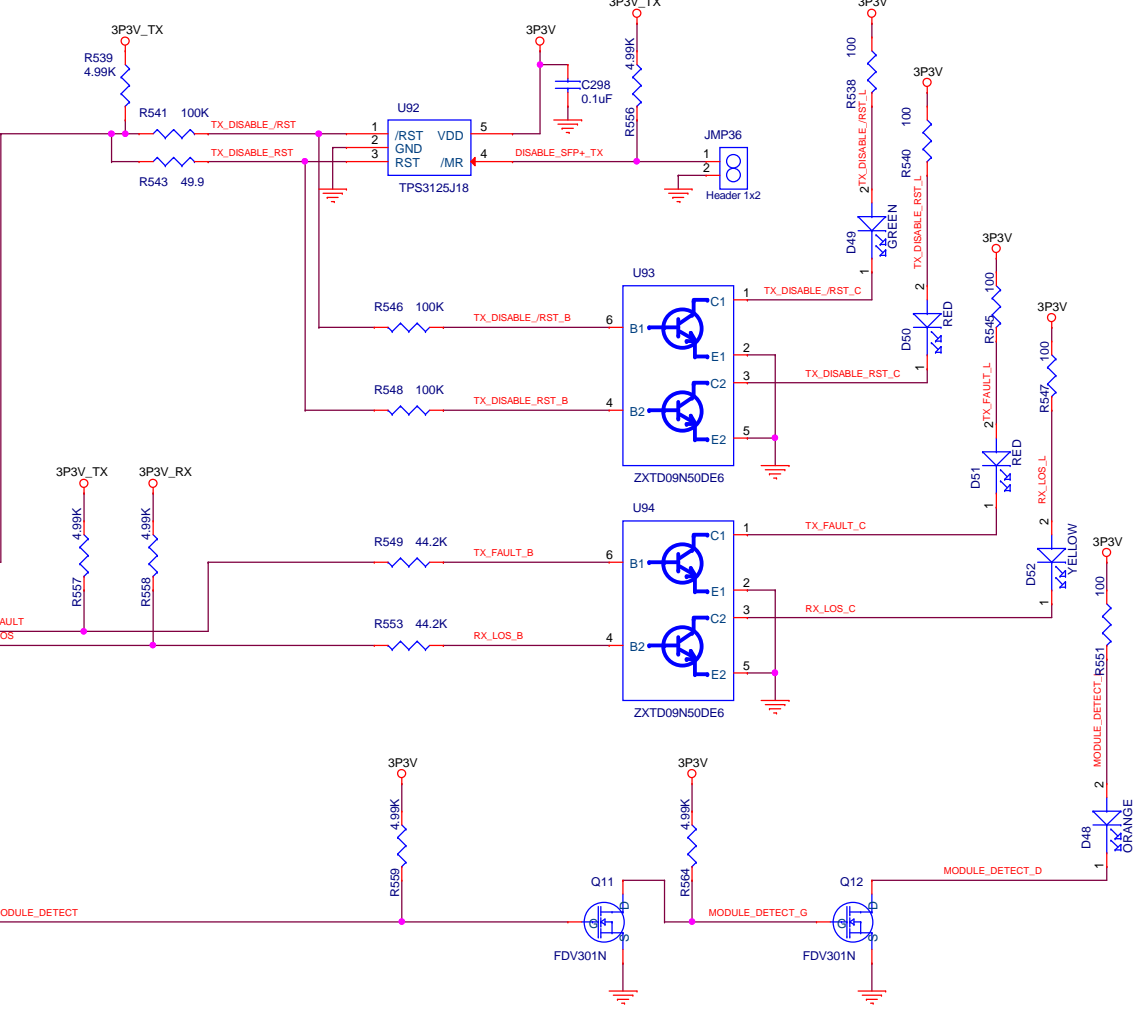
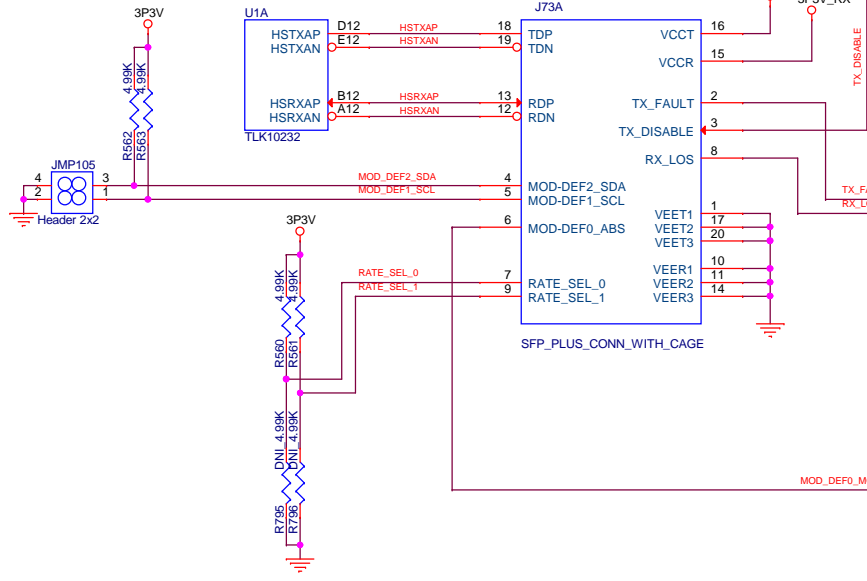
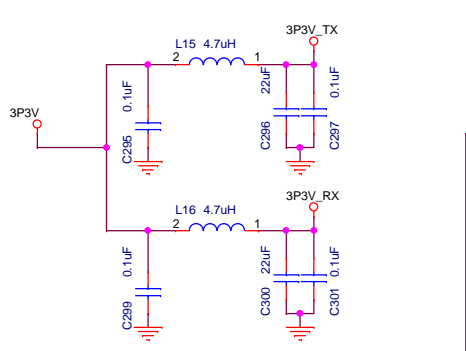
NOTE:  
 1. MATCH LOW SPEED INPUT AND OUTPUT TRACE LENGTHS TO EACHOTHER  
 2. MATCH HIGH SPEED TRANSMIT AND RECEIVE TRACE LENGTHS TO EACHOTHER



PAGE TITLE			
LOW SPEED DATA SIGNALS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	12 of 15



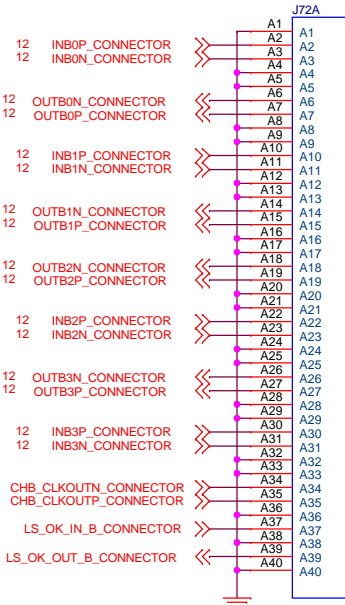
RESISTORS ARE USED TO PROVIDE COMMON PATH TO GROUND. PLACE ONE ON EACH SIDE OF OPTICAL MODULE CAGE NEAR THE MIDDLE OF THE MODULE.



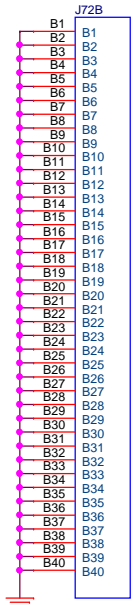
THE HIGH SPEED TX LINES SHOULD BE AC COUPLED IN THE SYSTEM WITH 0.1uF CAPACITORS FOR PROPER OPERATION. ZERO OHM RESISTORS ARE INSTALLED ON THIS BOARD TO ALLOW FOR EXTERNAL LOOPBACK BETWEEN THE HSTXB AND HSRXB UTILIZING THE AC CAPACITORS ON THE HSRXB PINS. THE ZERO OHM RESISTORS CAN BE REPLACED WITH 0.1uF CAPACITORS IF AC COUPLING CAPACITORS ARE NEEDED ON THESE SIGNALS.



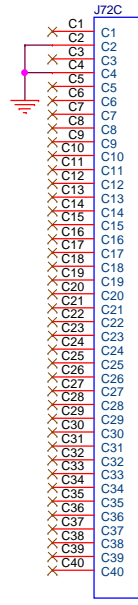
PAGE TITLE			
HIGH SPEED DATA SIGNALS			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	13 of 15



SEAF\_ASP-134486-01



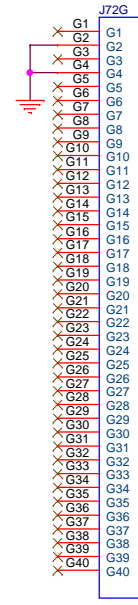
SEAF\_ASP-134486-01



SEAF\_ASP-134486-01



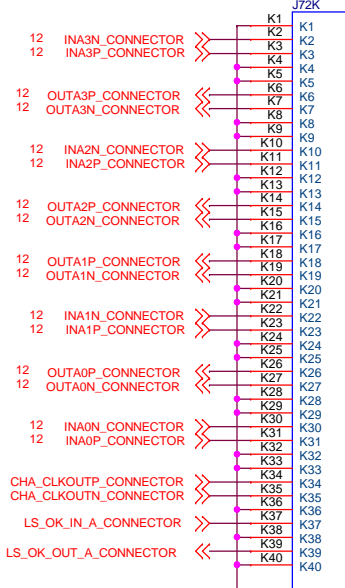
SEAF\_ASP-134486-01



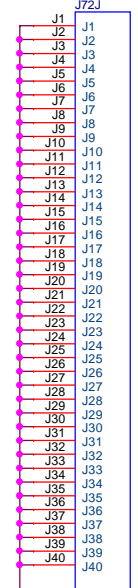
SEAF\_ASP-134486-01



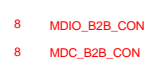
SEAF\_ASP-134486-01



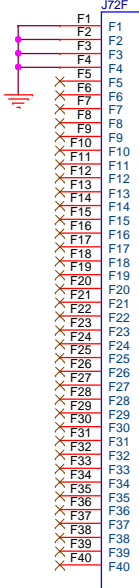
SEAF\_ASP-134486-01



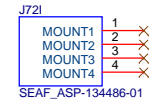
SEAF\_ASP-134486-01



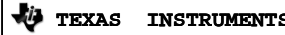
SEAF\_ASP-134486-01

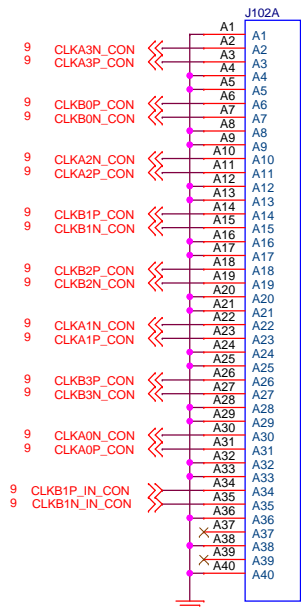


SEAF\_ASP-134486-01

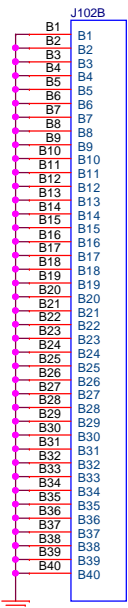


PAGE TITLE			
DATA BOARD TO BOARD CONNECTOR			
SIZE	DOCUMENT NUMBER	REV	PAGE
B	6566789	B	14 of 15

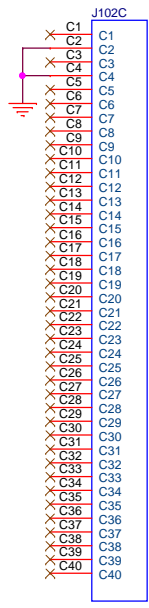




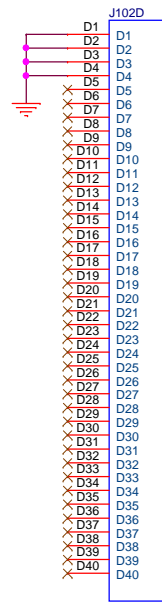
SEAF\_ASP-134486-01



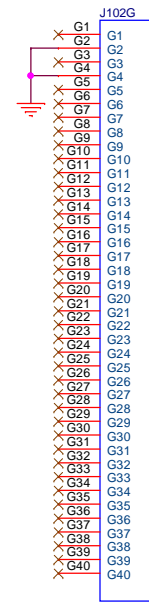
SEAF\_ASP-134486-01



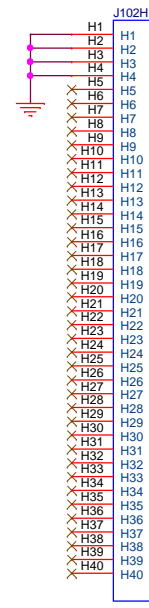
SEAF\_ASP-134486-01



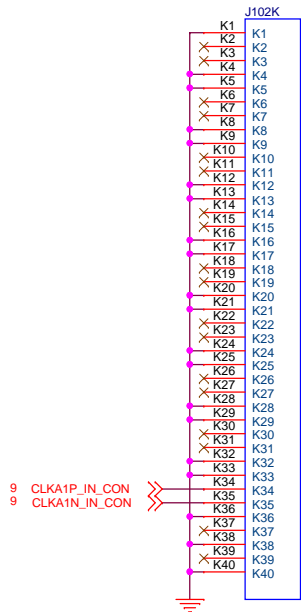
SEAF\_ASP-134486-01



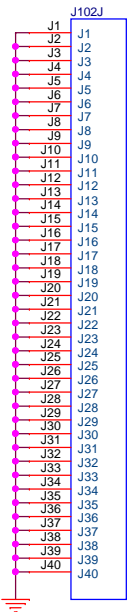
SEAF\_ASP-134486-01



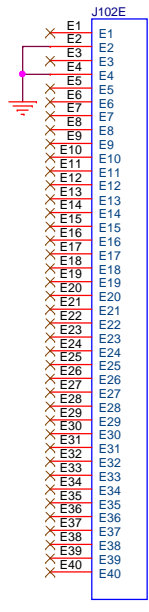
SEAF\_ASP-134486-01



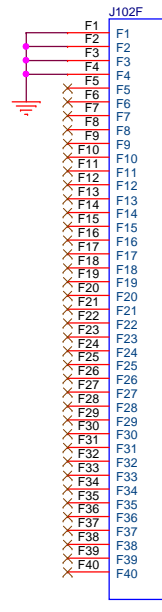
SEAF\_ASP-134486-01



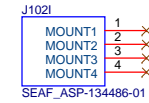
SEAF\_ASP-134486-01



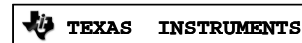
SEAF\_ASP-134486-01



SEAF\_ASP-134486-01



SEAF\_ASP-134486-01



PAGE TITLE			
CLOCK BOARD TO BOARD CONNECTOR			
SIZE	DOCUMENT NUMBER	REV	PAGE
B		B	15 of 15

## IMPORTANT NOTICE FOR TI REFERENCE DESIGNS

Texas Instruments Incorporated ("TI") reference designs are solely intended to assist designers ("Buyers") who are developing systems that incorporate TI semiconductor products (also referred to herein as "components"). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer's systems and products.

TI reference designs have been created using standard laboratory conditions and engineering practices. **TI has not conducted any testing other than that specifically described in the published documentation for a particular reference design.** TI may make corrections, enhancements, improvements and other changes to its reference designs.

Buyers are authorized to use TI reference designs with the TI component(s) identified in each particular reference design and to modify the reference design in the development of their end products. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI REFERENCE DESIGNS ARE PROVIDED "AS IS". TI MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE REFERENCE DESIGNS OR USE OF THE REFERENCE DESIGNS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. TI DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO TI REFERENCE DESIGNS OR USE THEREOF. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY BUYERS AGAINST ANY THIRD PARTY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON A COMBINATION OF COMPONENTS PROVIDED IN A TI REFERENCE DESIGN. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES, HOWEVER CAUSED, ON ANY THEORY OF LIABILITY AND WHETHER OR NOT TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, ARISING IN ANY WAY OUT OF TI REFERENCE DESIGNS OR BUYER'S USE OF TI REFERENCE DESIGNS.

TI reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques for TI components are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

Reproduction of significant portions of TI information in TI data books, data sheets or reference designs is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards that anticipate dangerous failures, monitor failures and their consequences, lessen the likelihood of dangerous failures and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in Buyer's safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed an agreement specifically governing such use.

Only those TI components that TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components that have **not** been so designated is solely at Buyer's risk, and Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.