

NOTES, UNLESS OTHERWISE SPECIFIED:

1. The netname "P12V" represents connection to the +12V power plane.
2. The netname "P3P3V" represents connection to the +3.3V power plane.
3. The netname "P1P8V" represents connection to the +1.8V digital power plane.
4. The netname "P1P15V" represents connection to the +1.15V power plane.
5. The netname "P1P8V_A" represents connection to the +1.8V controller analog supply power plane.
6. The netname "GND" represents connection to the ground plane.
7. A "Z" suffix on a signal name indicates an active low signal.
8. All components with designators "U*", "Q*", and "D*" are electrostatic discharge sensitive.



COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	ECO 2139077: Initial Release	2/18/2014	
B	ECO 2141121: Updated to rev B	4/8/2014	
C	ECO 2142182: Updated to rev C	5/28/2014	
D	ECO 2143315: Updated to rev D	8/11/2014	

BEFORE USING TECHNICAL INFORMATION, THE USER SHOULD CAREFULLY READ THE FOLLOWING TERMS.

The term "Technical Information" includes reference designs, drawings, specifications, and other information relating to TI digital imaging products or applications, contained herein or provided separately in any format or via any medium.

TI is providing Technical Information for the convenience of purchasers of digital imaging products ("Users"), and will not accept any responsibility or liability arising from providing the Technical Information or its use. Any use or reliance on Technical Information is strictly the responsibility of the User.

1. **No Warranty.** THE TECHNICAL INFORMATION IS PROVIDED "AS IS". TI MAKES NO WARRANTIES OR REPRESENTATIONS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING LACK OF VIRUSES, ACCURACY, OR COMPLETENESS. TI DISCLAIMS ANY WARRANTY OF TITLE, 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 THE TECHNICAL INFORMATION OR THE USE OF THOSE MATERIALS.
2. **Warranty for Products Not Affected.** The foregoing exclusion and disclaimer of warranty does not affect or diminish any warranty rights with regard to digital imaging products. Such rights are governed exclusively by the terms of a written and signed purchase agreement with TI.
3. **Limitations and Exclusion of Damages.** 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 THE TECHNICAL INFORMATION OR THE USE OF THE TECHNICAL INFORMATION.
4. **No Engineering Services.** User is fully responsible for all design decisions and engineering with regard to its products, including decisions relating to application of digital imaging products. By providing Technical Information TI does not intend to offer or provide engineering services or advice concerning User's design. If User desires engineering services, then User should rely on its retained employees and consultants and/or procure engineering services from a licensed professional engineer ("LPE").
5. **Compliance with Export Control Laws.** Unless prior authorization is obtained from the U.S. Department of Commerce, User may not export, re-export, or release, directly or indirectly, any Technical Information, or export, directly or indirectly, any direct product of such Technical Information to any destination or country to which the export, re-export or release of the Technical Information or direct product is prohibited by the Export Administration Regulations of the U.S. Department of Commerce ("EAR").

		DWN	DATE	8/11/2014	TEXAS INSTRUMENTS (C) COPYRIGHT 2014 TEXAS INSTRUMENTS ALL RIGHTS RESERVED		
		ENGR		8/11/2014			
		APVD		8/11/2014			
		MFG	XXXXXXXX				
2513757	0314PO	QA	XXXXXXXX		TITLE ESD, Single DLPC900 Hi-Res Main Board Reference Design		
NEXT ASSY	USED ON				A3 DRAWING NO 2513756 REV D		
APPLICATION		SW	Cadence 16.5		SCALE SHEET 1 of 19		

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.

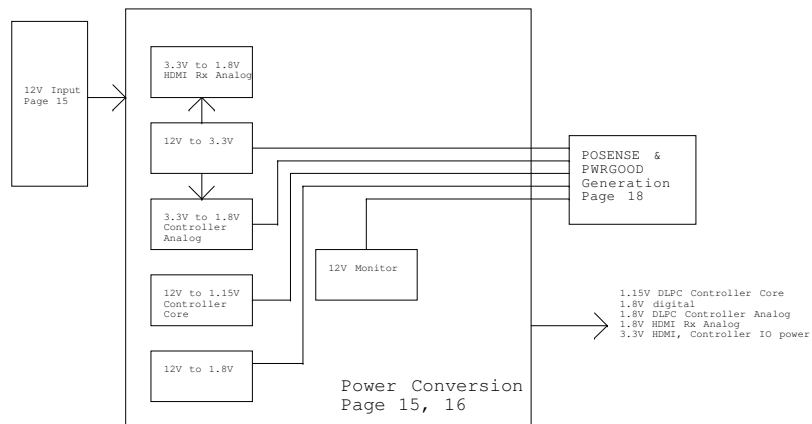
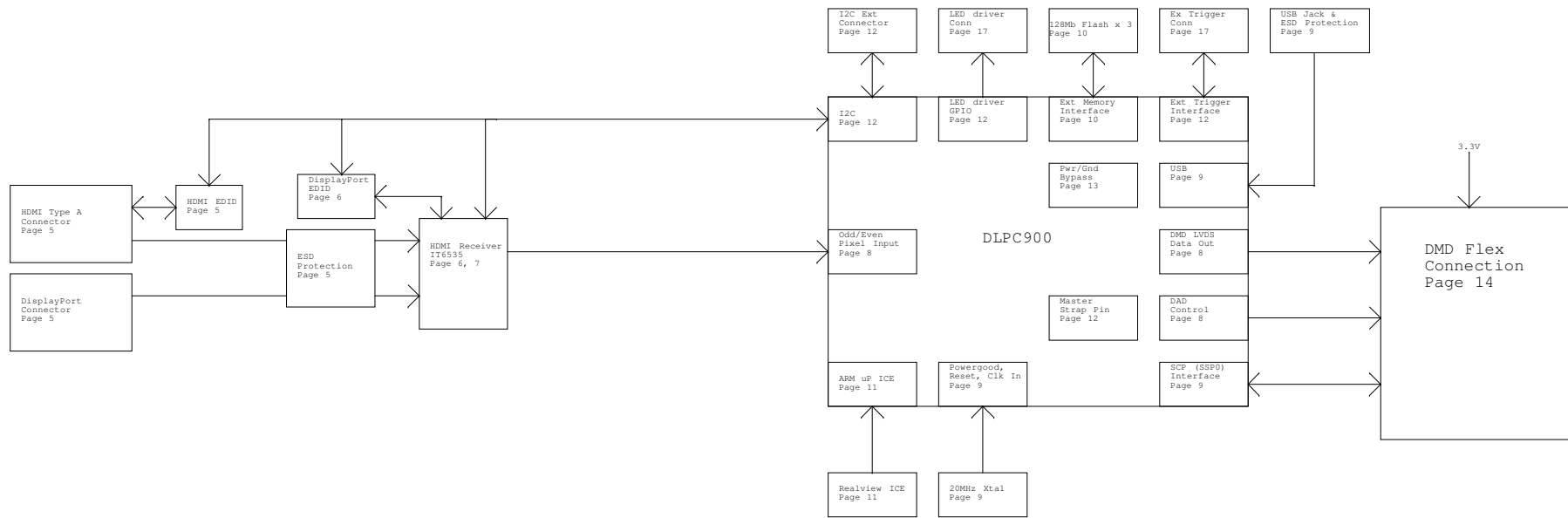
In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components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

TEXAS INSTRUMENTS	DWN	DATE	A3	DRAWING NO	2513756	REV	D
	ISSUE DATE	8/11/2014					
				SCALE	SHEET 2 OF 19		

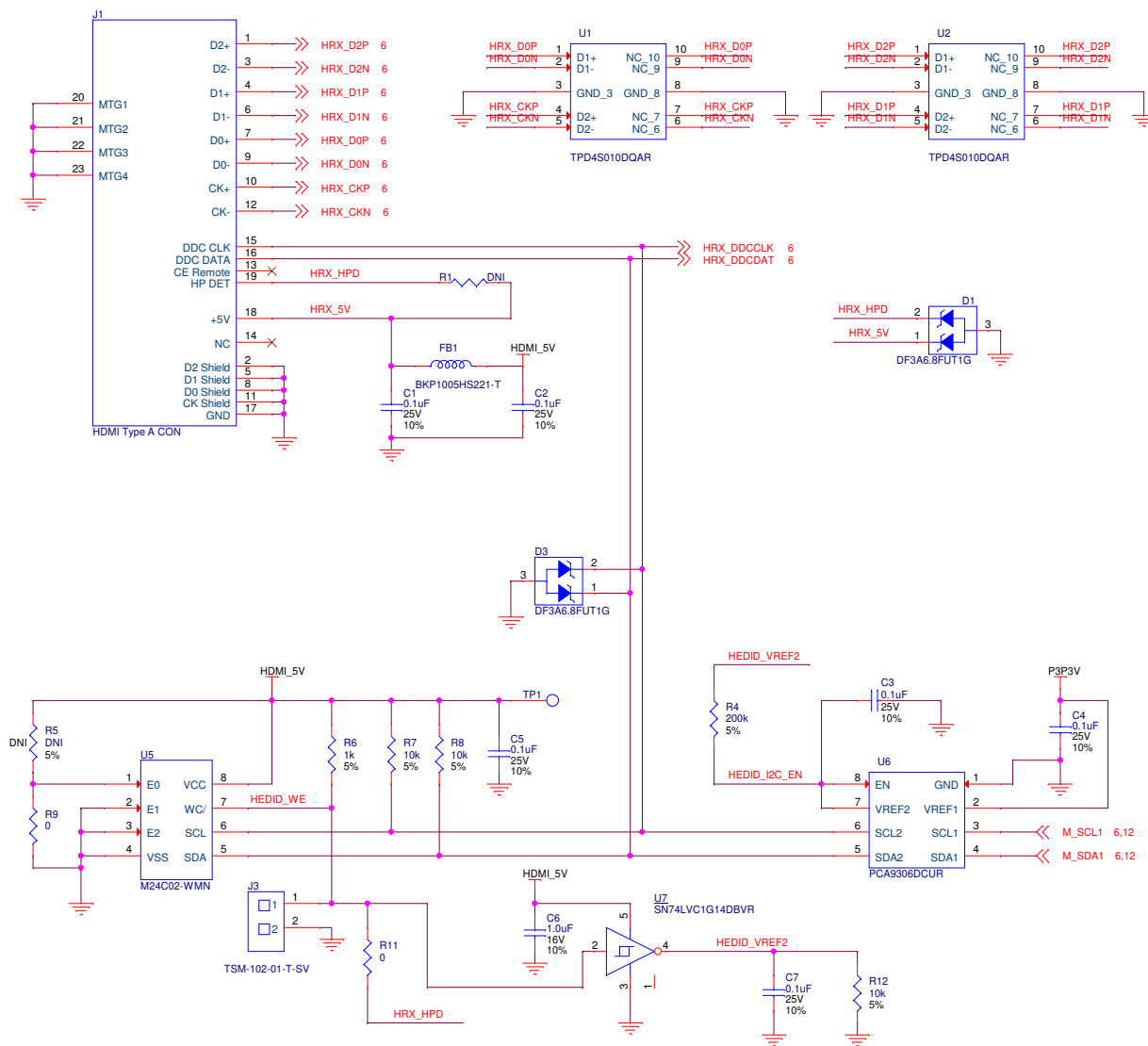
Table of Contents

Page	Description
1	Title
2	Import Notice for TI Products
3	Table Of Contents
4	Block Diagram
5	HDMI, DisplayPort Input/ESD
6	IT6535 Input/Ouput Ports
7	IT6535 Power/Ground Bypass
8	DLPC Controller Video, DMD, DAD in/out ports
9	DLPC Controller: USB, Reset/Clock, SSP0
10	DLPC Controller: 128Mb x 3 flash interface
11	DLPC Controller: JTAG, ICE interface
12	DLPC Controller: I2C, Dual Controller ports, Trigger GPIOs
13	DLPC Controller: Power/Ground Bypass
14	DMD Flex Connector
15	Power Conv: 12V -->1.15V, 1.8V, 3.3V switchers
16	Power Conv: LDOs
17	Input/output triggers, LED driver connector
18	Posense, Powergood
19	Notes & Revision History



TEXAS INSTRUMENTS

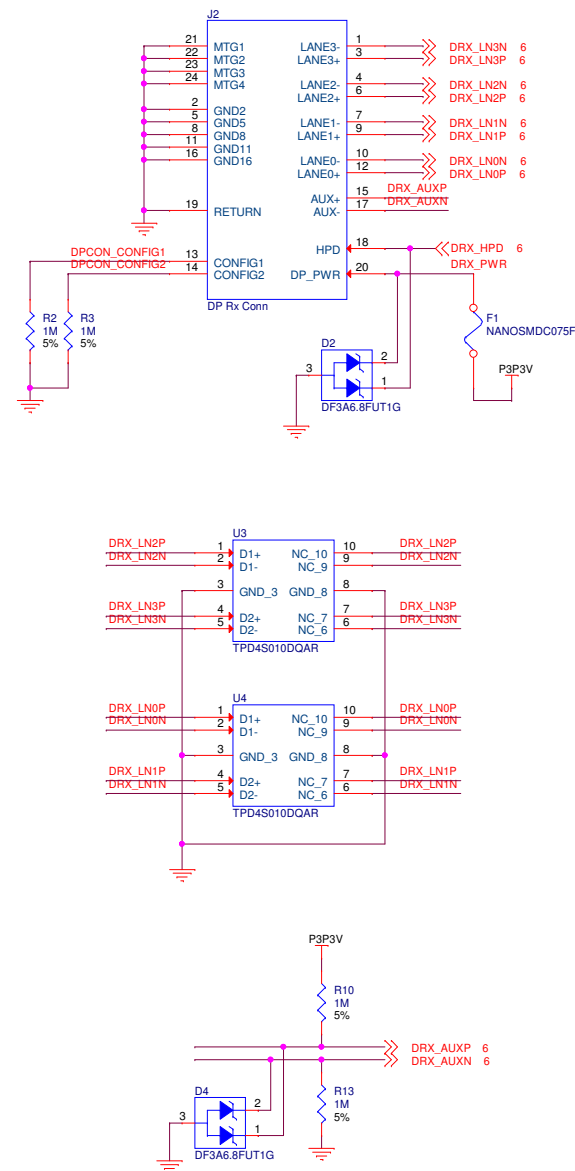
DWN	DATE 8/11/2014	A3	DRAWING NO 2513756	REV D
ISSUE DATE 8/11/2014	SCALE	SHEET 4 OF 19		



To program HDMI EDID

- install jumper to enable PROM write and disable hot plug detect
- connect HDMI cable to supply 5V
- use TI control program to update EDID

HDMI TypeA Rx Conn, ESD, and EDID



DisplayPort Rx Conn, ESD

TEXAS INSTRUMENTS

DWN	DATE	A3	DRAWING NO	REV
	8/11/2014		2513756	D
ISSUE DATE	8/11/2014	SCALE	SHEET 5 OF 19	

The schematic diagram illustrates the IT6535 power management IC and its connections. The IC is shown with its internal components, including a crystal (X1) and various control logic blocks. The following table summarizes the key components and their connections:

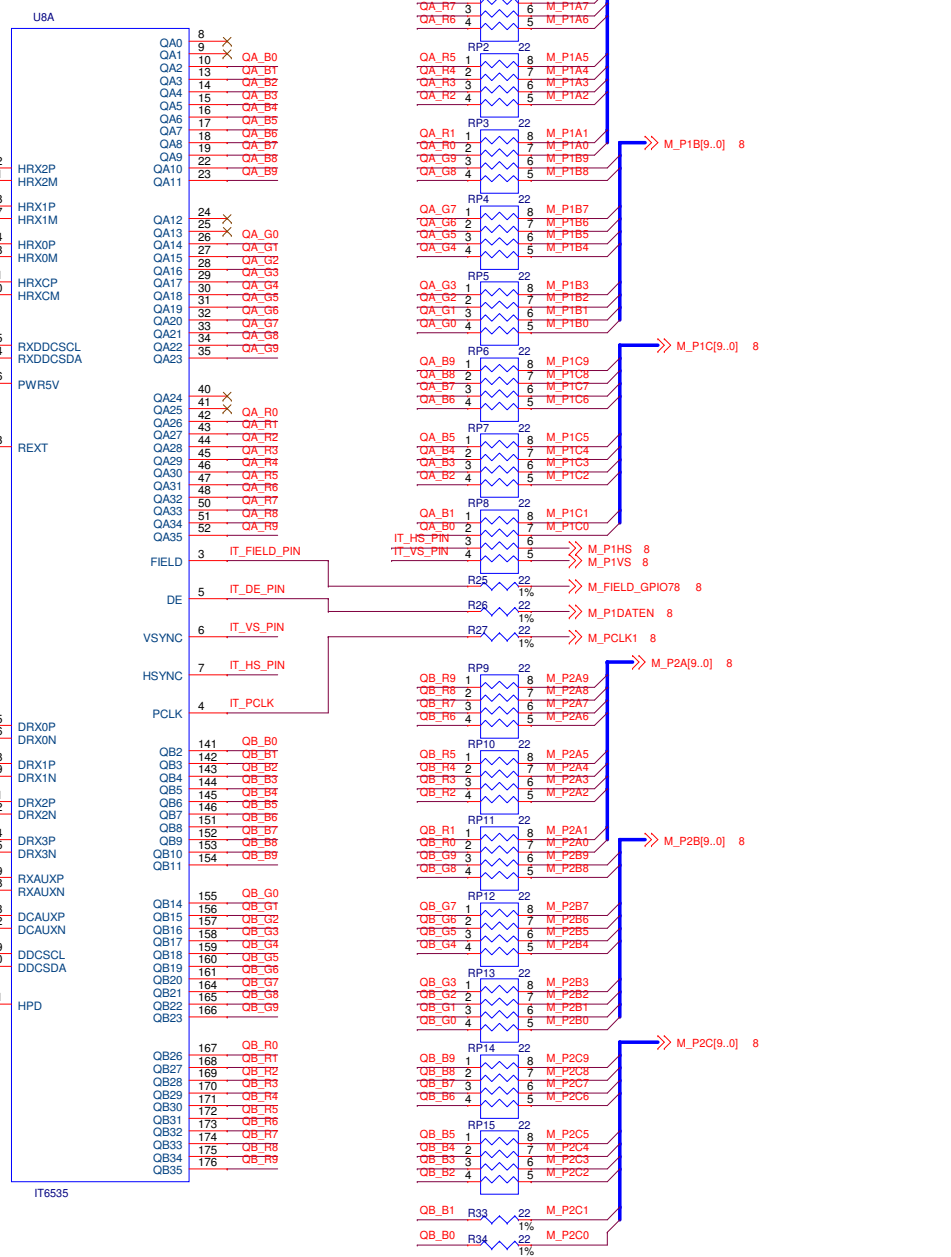
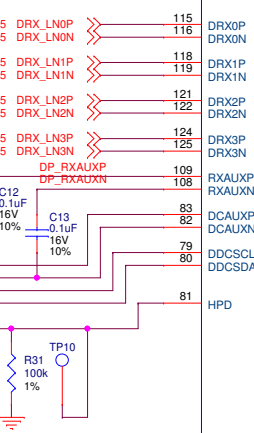
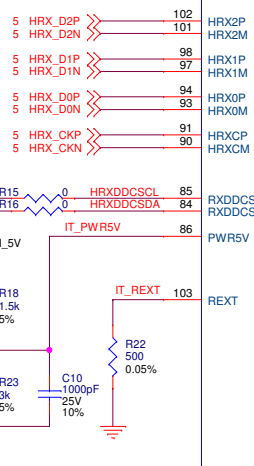
Component	Value / Label	Pin / Connection
Capacitor	C8, C9	18pF, 50V, 5%
Resistor	R14, R19, R20, R21, R24	1M, 5%, 4.7k, 5%, 10k, 5%, 4.7k, 5%
Crystal	X1	27MHz
IC Pin	IT_XTALIN, IT_XTALOUT, IT_PCADR, IT_ENTEST, IT_EMEMVPP, AFE_ARSTZ, M_SCL1, M_SDA1, PCADR, ENTENT, EMEM_VPP	132, 131, 74, 77, 78, 76, 73, 49
IC Pin	SCK_DCLK_MCLK, WS_DR0, I2S0_DL0, I2S1_DR1, I2S2_DR1, I2S3_DR2, SPDIF_DL2, INT#	134, 135, 136, 137, 138, 139, 140, 75
External Component	TP3, TP2, TP4, TP5, TP6, TP7, TP8, TP9	Test points
Power Supply	P3P3V	3.3V
Signal	DNI	Differential Input
Signal	HDMI_INTZ	Interrupt

Additional notes from the diagram:

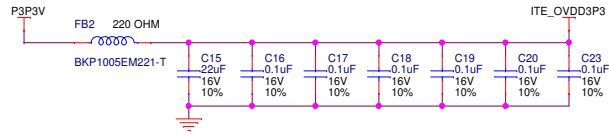
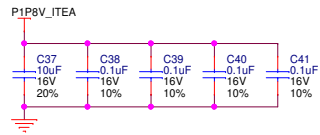
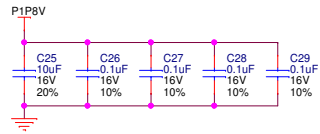
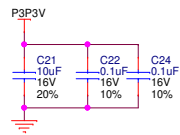
- The AFE_ARSTZ pin is connected to a pull-up resistor (R19) to P3P3V.
- The M_SCL1 and M_SDA1 pins are connected to a pull-up resistor (R24) to P3P3V.
- The PCADR pin is connected to a pull-up resistor (R20) to P3P3V.
- The ENTENT and EMEM_VPP pins are connected to a pull-up resistor (R21) to P3P3V.
- The INT# pin is connected to a pull-up resistor (R17) to P3P3V.
- The TP9 pin is connected to a pull-up resistor (R17) to P3P3V.

Must connect I2C and interrupt to controller for register setup

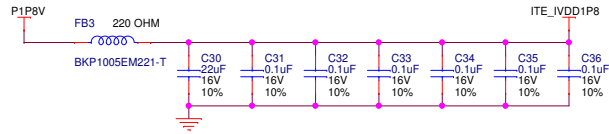
The schematic diagram illustrates the DP+ interface circuit for the M24C02-WMN. The circuit is powered by a P3P3V supply. The M24C02-WMN (U9) is connected to P3P3V, E0, E1, E2, VSS, and SDA. The SN74CB3Q3306 (U10) is connected to P3P3V, VCC, 1OE, 1A, 1B, 2OE, 2A, 2B, and M_SCL1, M_SDA. The TSM-102-01-T-SV (J4) is connected to P3P3V, 1, 2, and DPIOCWR_OEZ. The circuit includes resistors R28 (1k 5%), R29 (10k 5%), R30 (10k 5%), and R32 (0 0), and a capacitor C14 (0.1uF 10%).



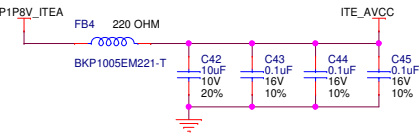
HDMI receiver input/output



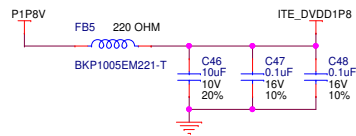
3.3V IO



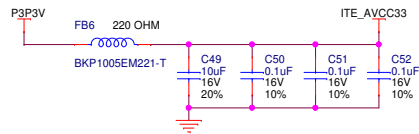
Digital logic core



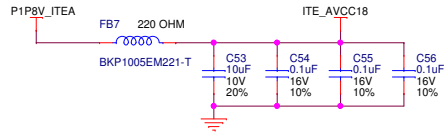
DP analog frontend



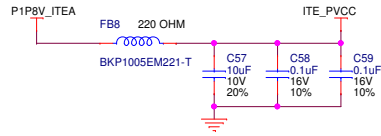
Logic power for analog frontend



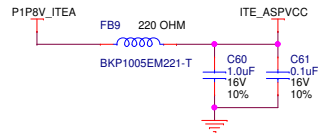
3.3V HDMI RX analog frontend



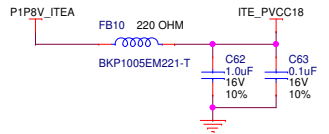
1.8V HDMI RX analog frontend



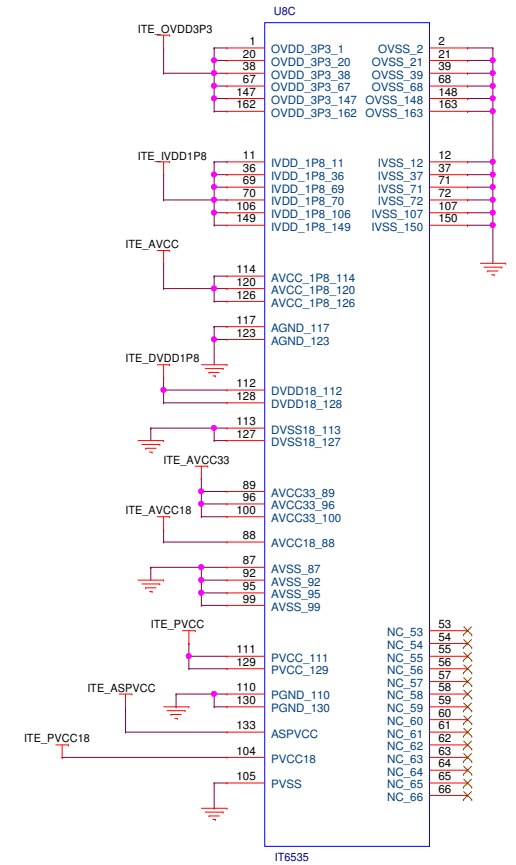
DP Rx PLL power



Crystal and audio PLL

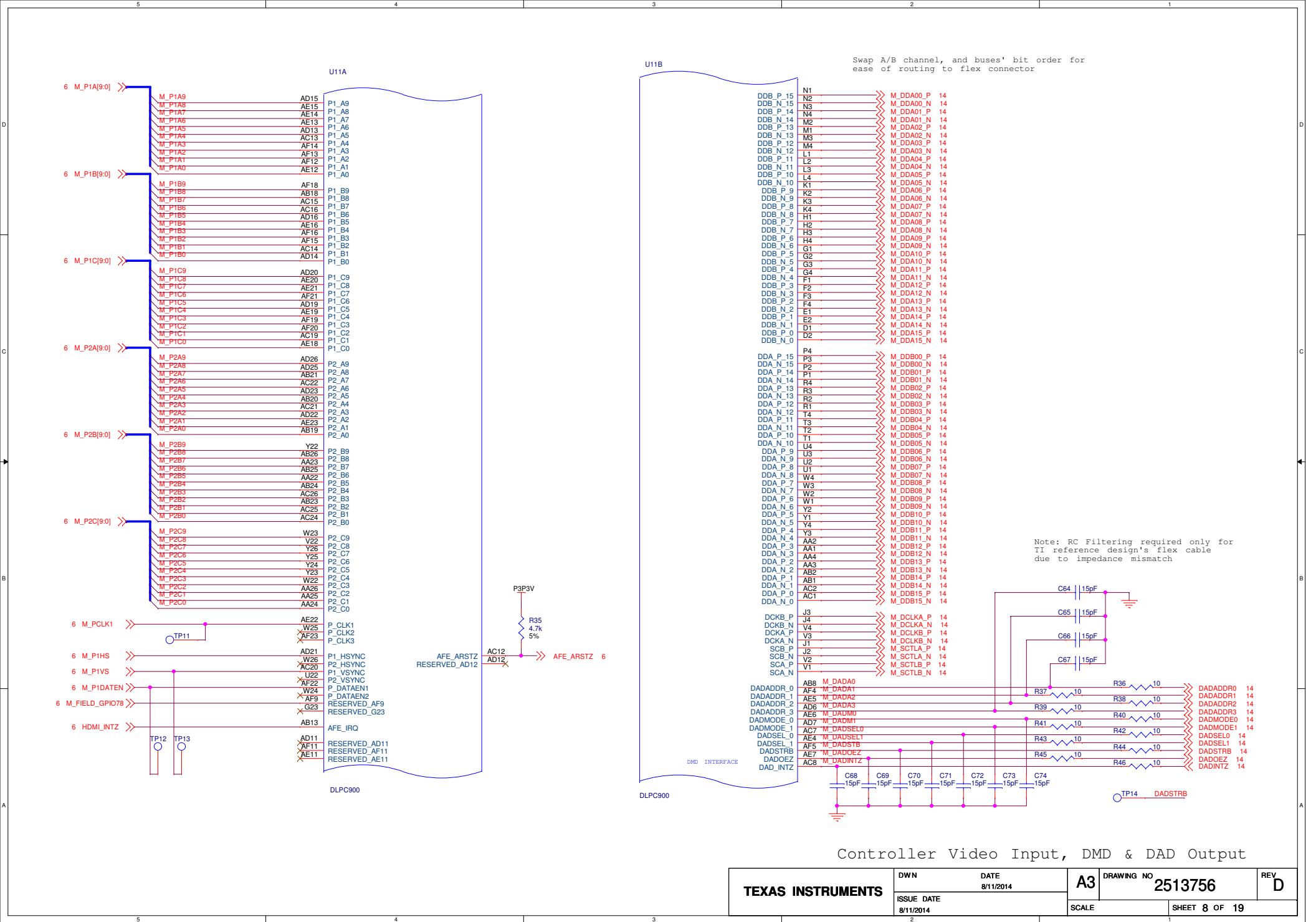


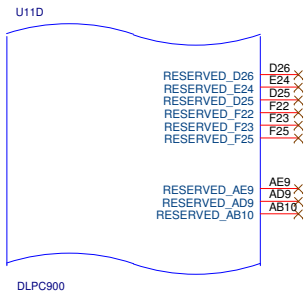
HDMI Rx PLL power



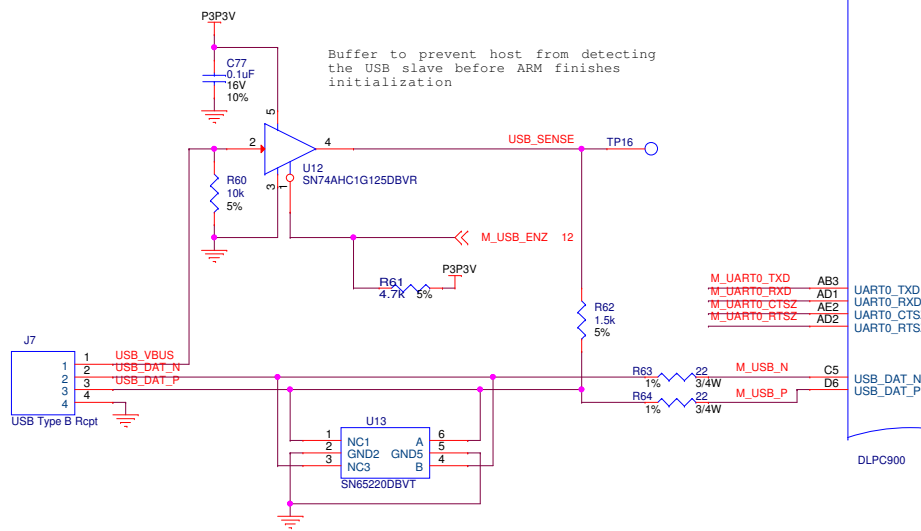
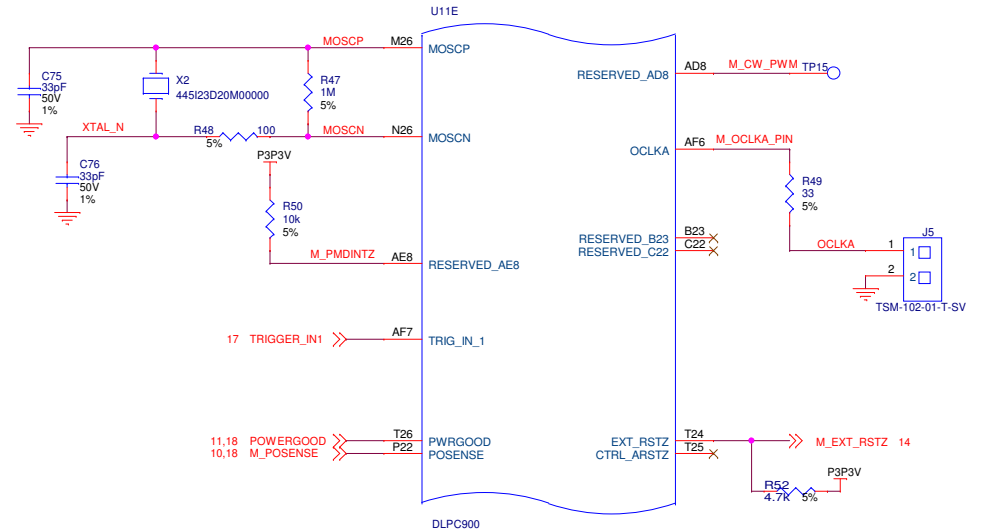
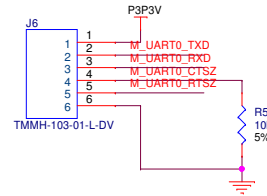
HDMI receiver power/gnd bypass

TEXAS INSTRUMENTS	DWN	DATE	A3	DRAWING NO	REV
	ISSUE DATE	8/11/2014			
			SCALE	2513756	D
				SHEET 7 OF 19	





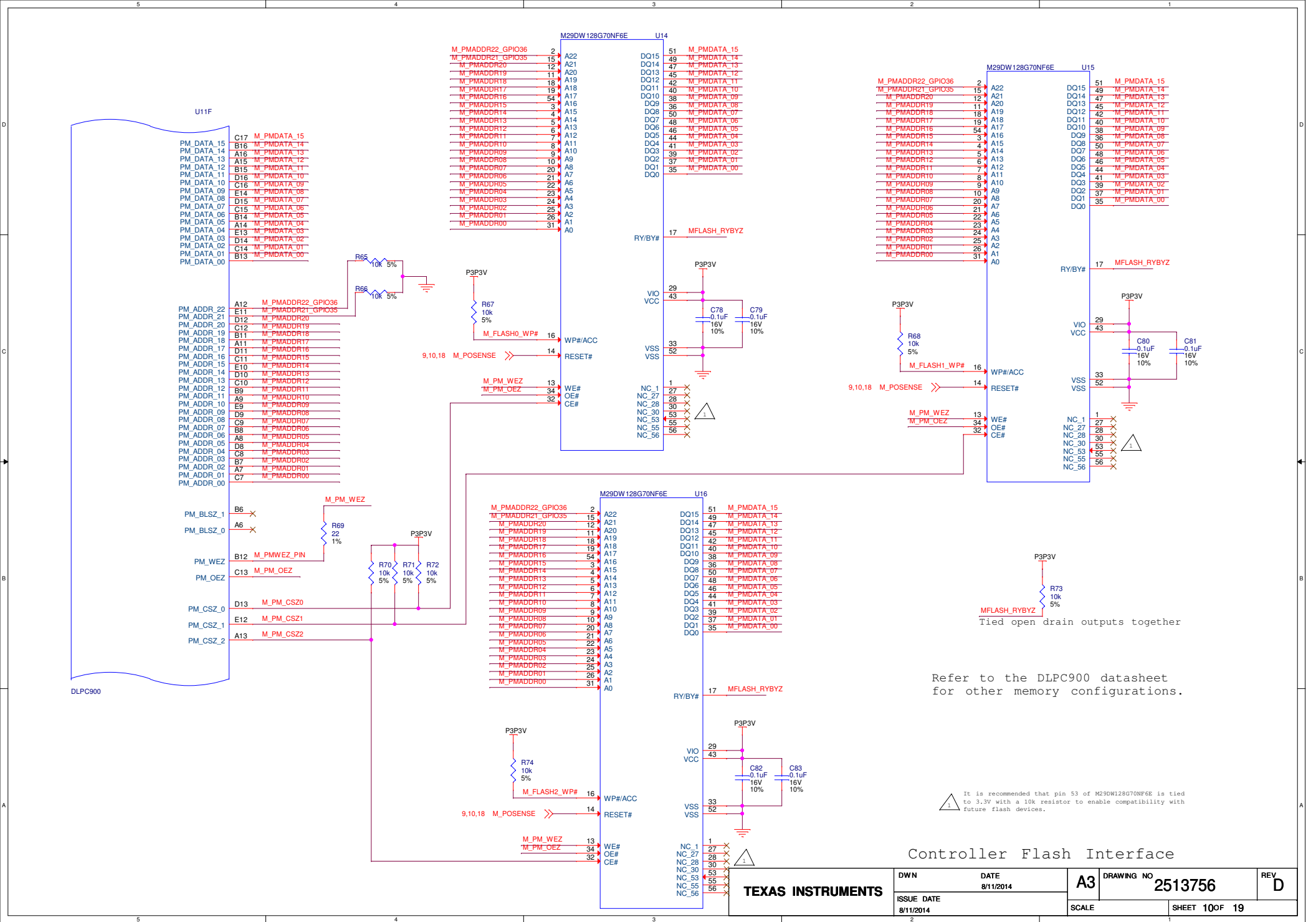
UART debug message port,
not needed for production



Controller SSP0, UART0, USB, Reset, OSC

TEXAS INSTRUMENTS

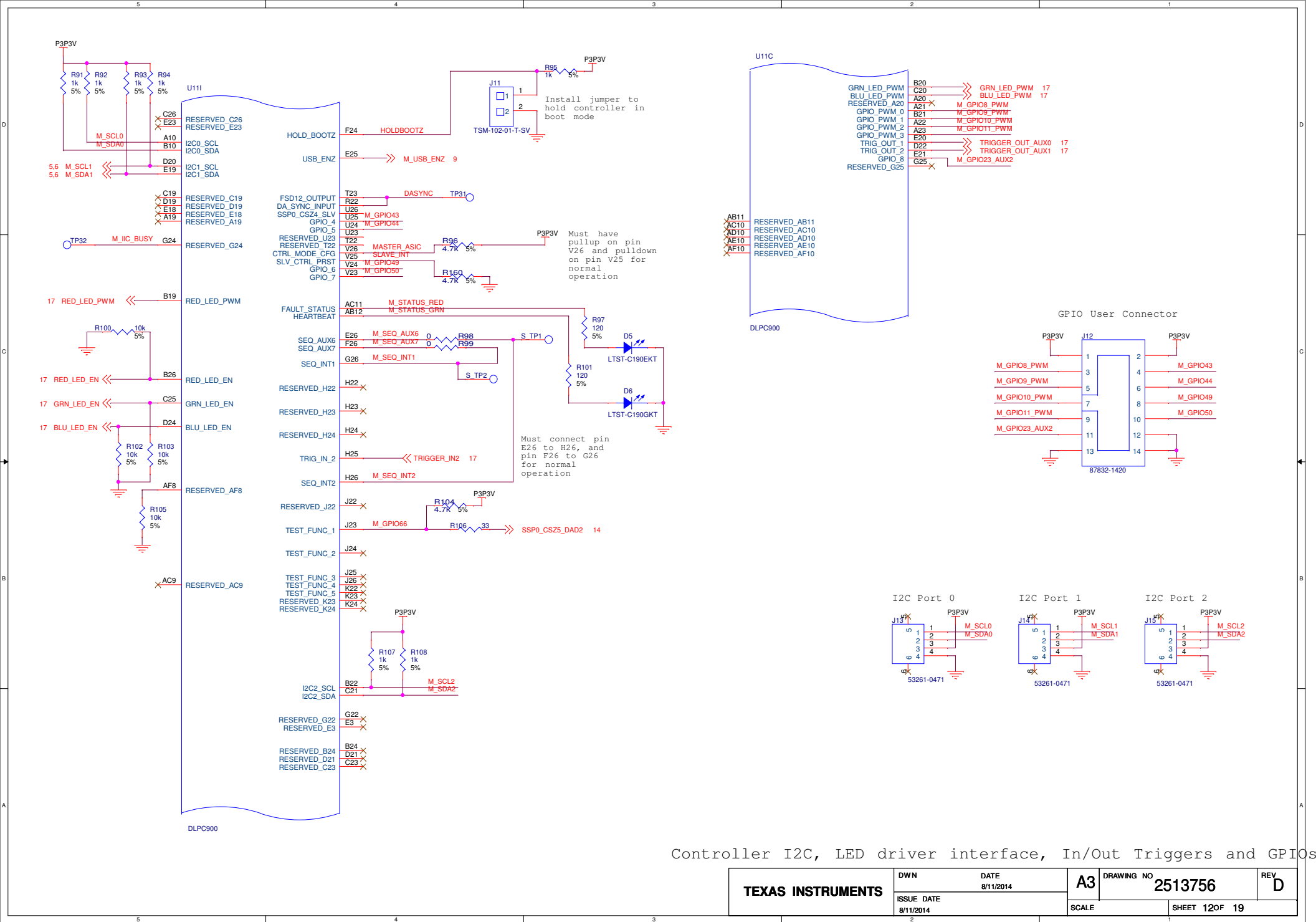
DWN	DATE	A3	DRAWING NO	REV
	8/11/2014		2513756	D
ISSUE DATE	8/11/2014	SCALE	SHEET 9 OF 19	

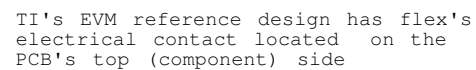


Controller Flash Interface

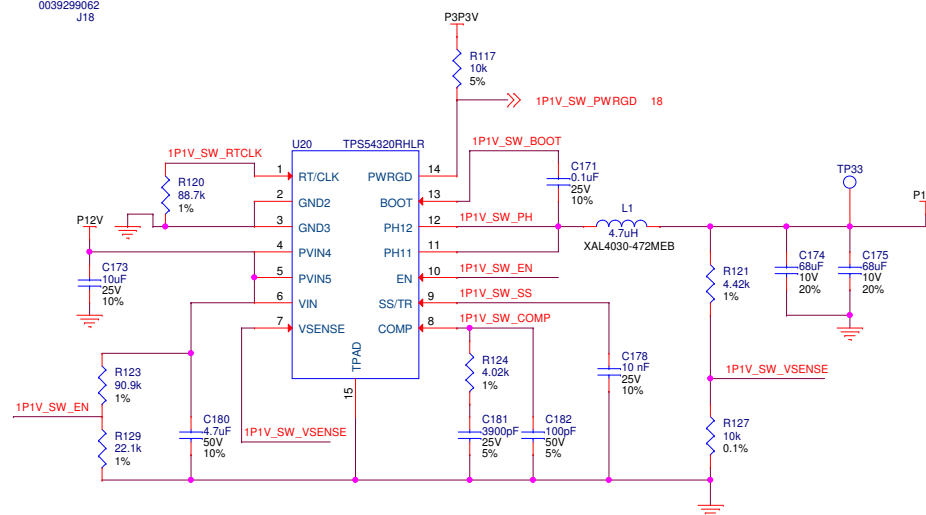
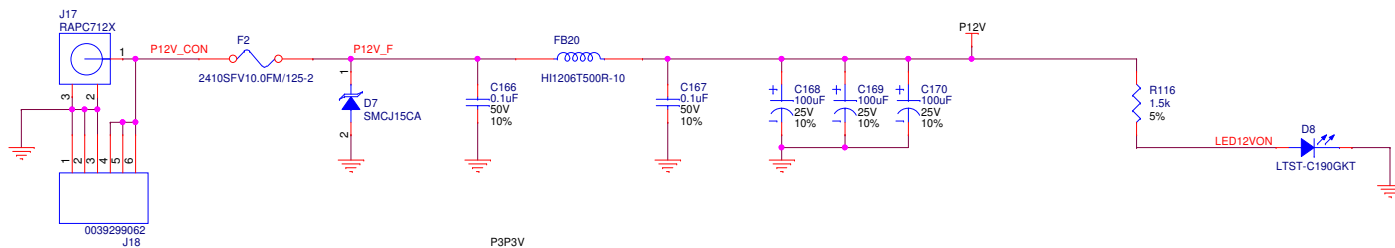
DWN	DATE 8/11/2014	A3	DRAWING NO 2513756		REV D
ISSUE DATE 8/11/2014			SCALE		SHEET 10 OF 19
2				1	

TEXAS INSTRUMENTS

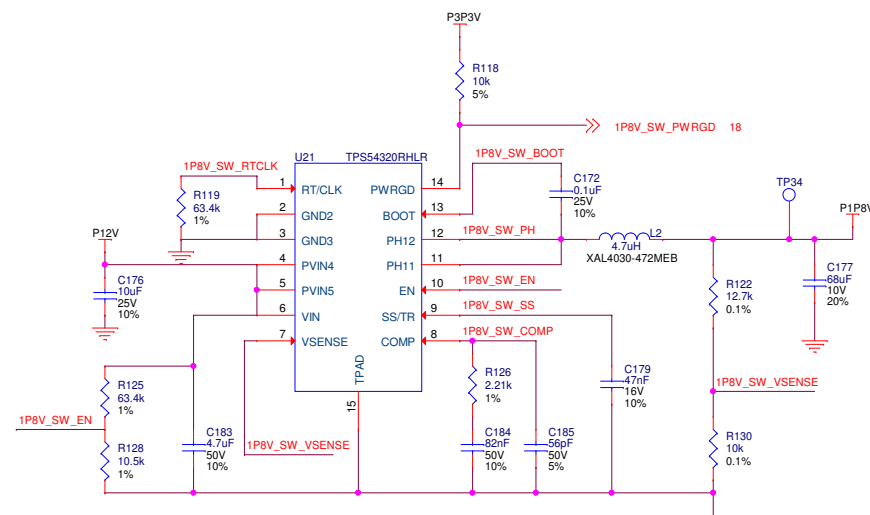




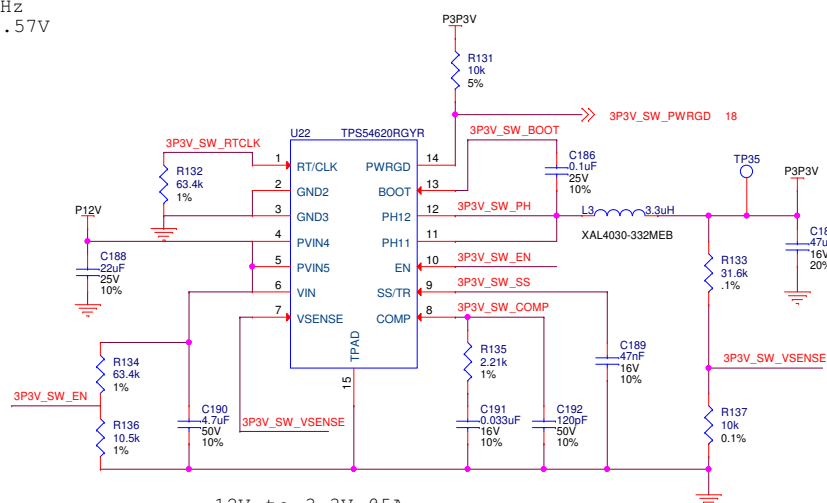
SCALE	SHEET 14 OF 19
-------	----------------



12V to 1.15V @2.5A
Switching Freq ~ 550KHz
Vstart/stop ~ 6.08V/5.57V
SS ~ 3.5ms



12V to 1.8V @3A
Switching Freq ~ 750KHz
Vstart/stop ~ 8.44V/7.95V
SS ~ 15ms



12V to 3.3V @5A
Switching Freq ~ 750KHz
Vstart/stop ~ 8.44V/7.95V
SS ~ 15ms

Power Generation 1.15V, 1.8V and 3.3V

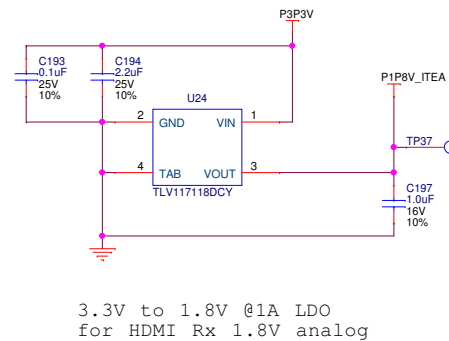
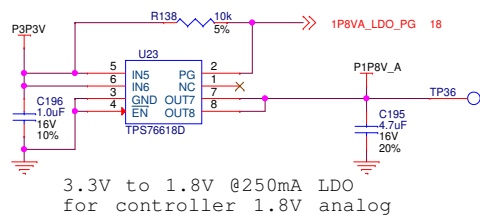
TEXAS INSTRUMENTS

DWN DATE
8/11/2014
ISSUE DATE
8/11/2014

A3 DRAWING NO
2513756

REV
D

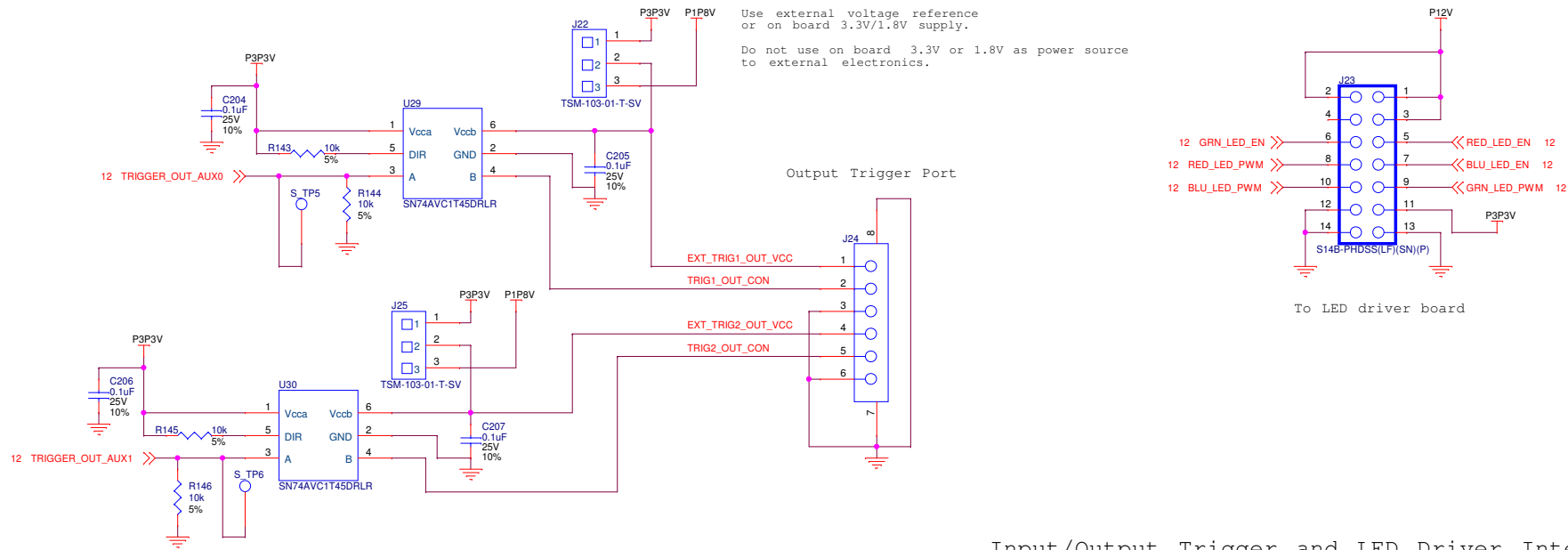
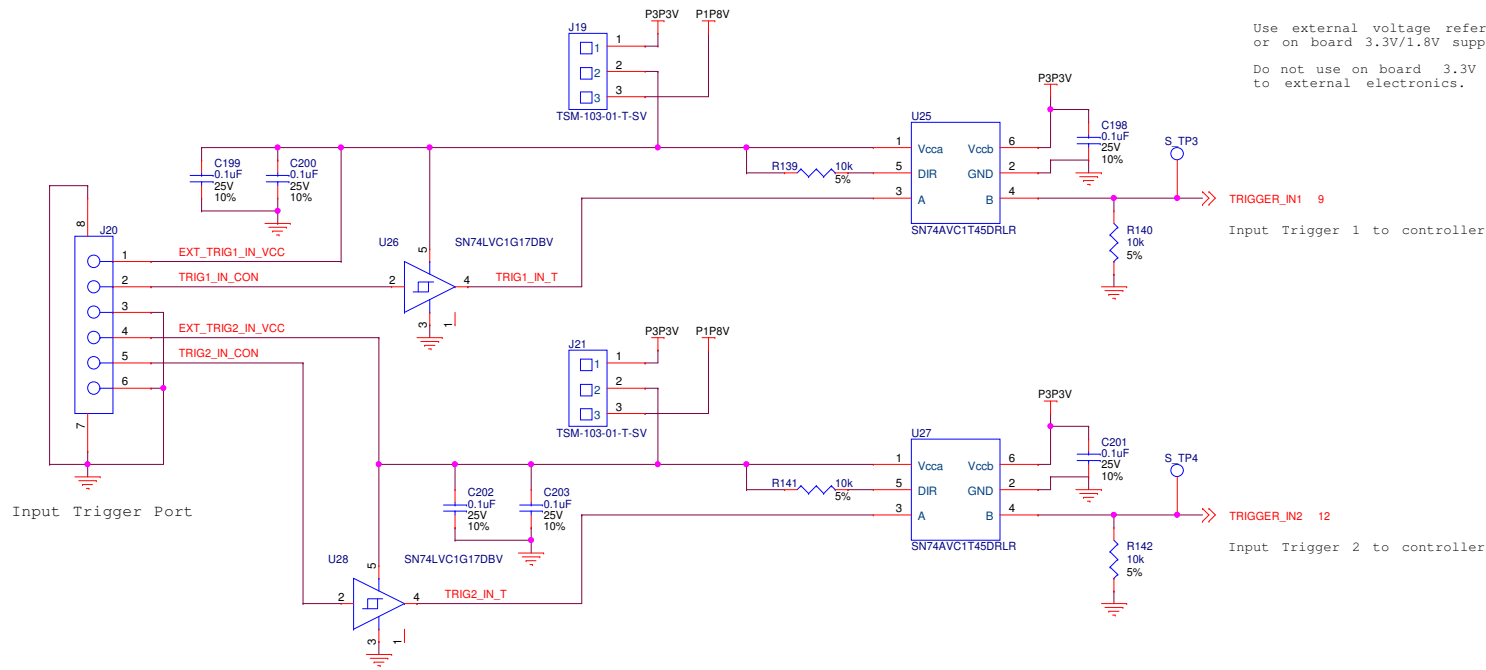
SCALE SHEET 15 OF 19



Distribute ground vias around PCB

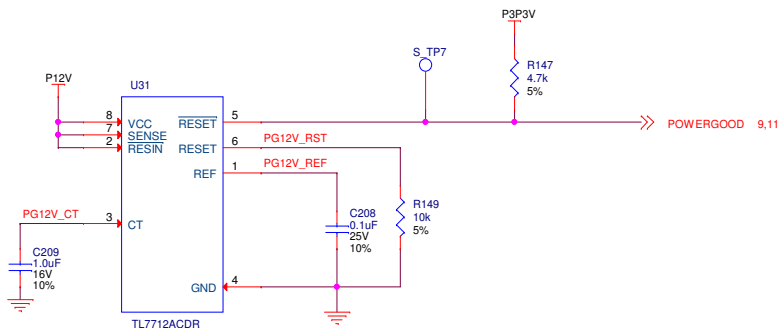
Power Generation LDO 1.8V LDOs

TEXAS INSTRUMENTS	DWN	DATE	A3	DRAWING NO	2513756	REV	D
	ISSUE DATE	8/11/2014					
		8/11/2014		SCALE	SHEET 16	OF 19	



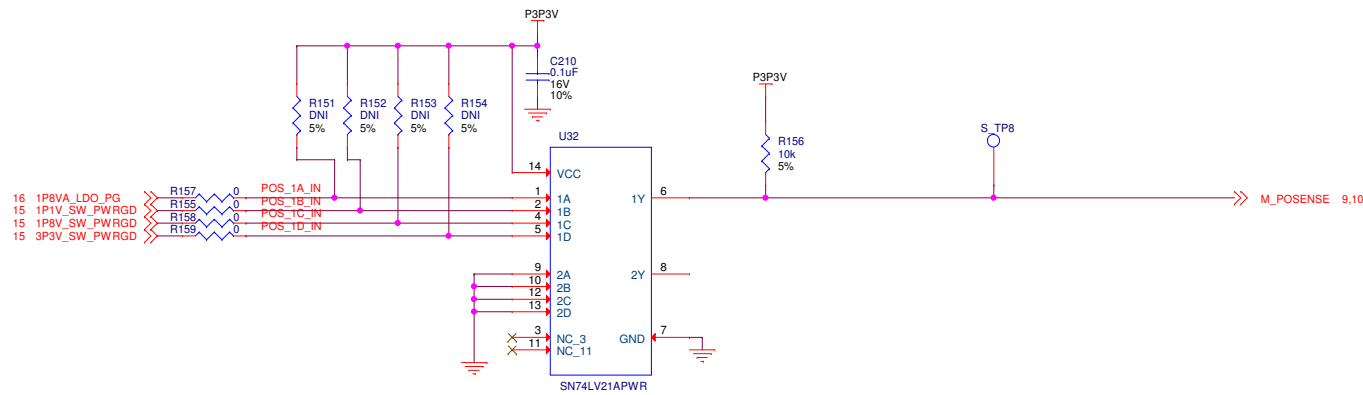
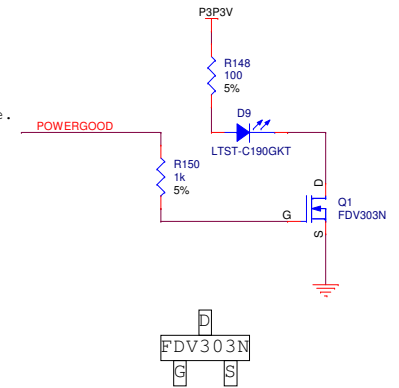
Input/Output Trigger and LED Driver Interface

TEXAS INSTRUMENTS	DWN	DATE	A3	DRAWING NO	REV
	ISSUE DATE	8/11/2014			
	8/11/2014		SCALE	2513756	D
				SHEET 17 OF 19	



Per controller spec (Fig. 3), POWERGOOD has no impact on operation for 60ms after rising edge of POSENSE. In other words, during power up, controller will ignore the state of PG until the internal PLL is locked (require up to 60ms). Controller will then sample the PG input to begin normal operation.

During power down, POSENSE has to remain valid high for at least 500us after PG is deasserted to allow controller to complete the DMD parking procedure. The 300+ uF input caps on 12V would ensure the power monitor to trip at ~11V to deassert PG while keeping regulators operational to maintain POSENSE for > 500us.



Generate Powergood, POSENSE

TEXAS INSTRUMENTS

DWN DATE 8/11/2014

ISSUE DATE 8/11/2014

A3

DRAWING NO 2513756

REV D

SCALE

SHEET 18 OF 19

REVISION HISTORY

Rev A

- PAGES - ALL
- initial rev

Rev B

- PAGES for U11
- Updated pins' name to match datasheet

Rev C

- Remove all references to DLPC910

Rev D

- PAGE 17
- Removed reference to 5V

- PAGE 5
- Updated U7

TEXAS INSTRUMENTS	DWN	DATE	A3	DRAWING NO	2513756	REV	D
	8/11/2014						
	ISSUE DATE		SCALE		SHEET 19 OF 19		
8/11/2014							