User's Guide
SPNU613–May 2017

Hercules™ TMS570LS12x/RM46 LaunchPad™

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1 Kit Overview

The LAUNCHXL2-TMS57012 and LAUNCHXL-RM46 LaunchPad kits from Texas Instruments provide a low cost vehicle to evaluate and develop with members of the Hercules family that are based on either the TMS570LS1224PGE or RM46L852PGE microcontrollers. Both kits are identical except for the Hercules microcontroller that is hosted by the kit. Figure 1 shows a photo of one of these kits with the major components labeled.

Project collateral and source files discussed in this application report can be downloaded from the following URL: http://www.ti.com/lit/zip/spnu613.

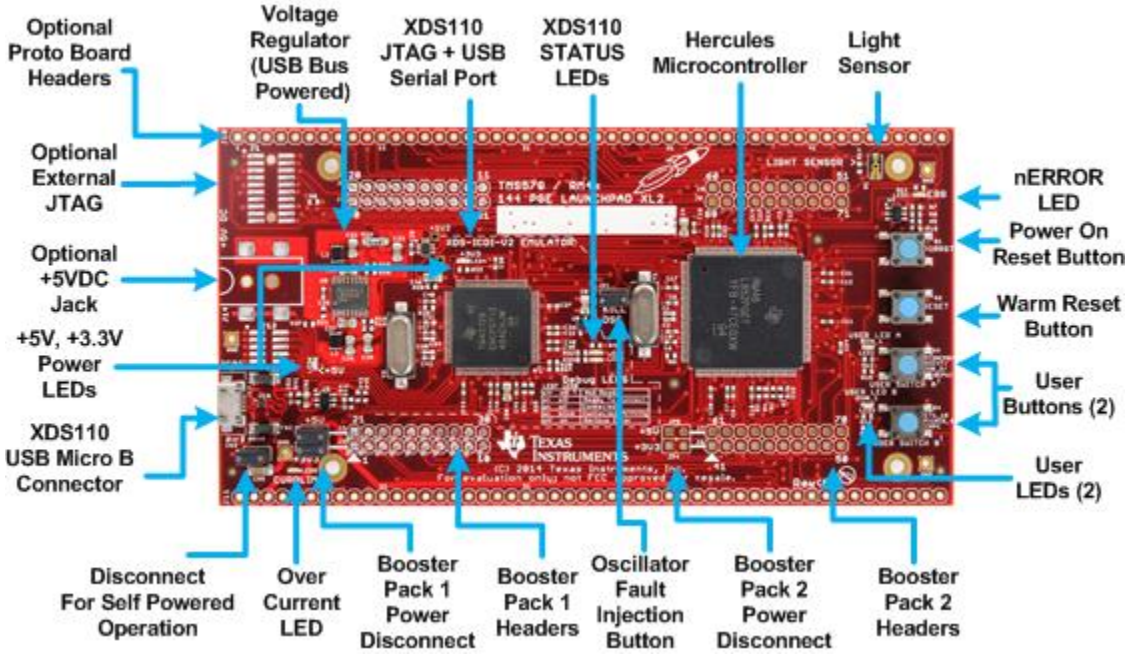


Figure 1. Hercules TMS570LS12224 / RM46L852 PGE LaunchPad

1.1 Kit Contents

Each Kit Contains:

- One LaunchPad board with:
  - On-board XDS110 Debug interface
  - Hercules microcontroller with 1280 KB of Flash, 64 KB of data Flash, and 192 KB of SRAM
  - LAUNCHXL2-TMS57012 is populated with the 160 MHz TMS570LS1224-PGE microcontroller.
  - LAUNCHXL2-RM46 is populated with the 220 MHz RM46L852-PGE microcontroller
- USB micro-B plug to USB-A plug cable
- Hercules LaunchPad Quick Start Guide
- Standard Terms and Conditions for Evaluation Modules

1.2 Specifications

Key operating specifications for the LaunchPad are listed in Table 1.

Table 1. LAUNCHXL2-TMS57012 and LAUNCHXL2-RM46 Specifications

Parameter	Value
Board Supply Voltage	4.75 VDC to 5.25 VDC from Micro-B Cable, Booster Pack Headers, or optional power jack J14
Power available to Expansion Boards (Total)	Sum of +5 V and +3.3 V Supply Current: 10mA max for USB Bus Powered Operation. 1A Max for power through J14.
Dimensions	5.150" x 2.650"
Operating Temperature Range	Room Temperature Operation Only

2 Hardware Description

2.1 Block Diagram

Figure 2 shows a block diagram of the LaunchPad printed circuit board. The major components of the board are described in the sections that follow.

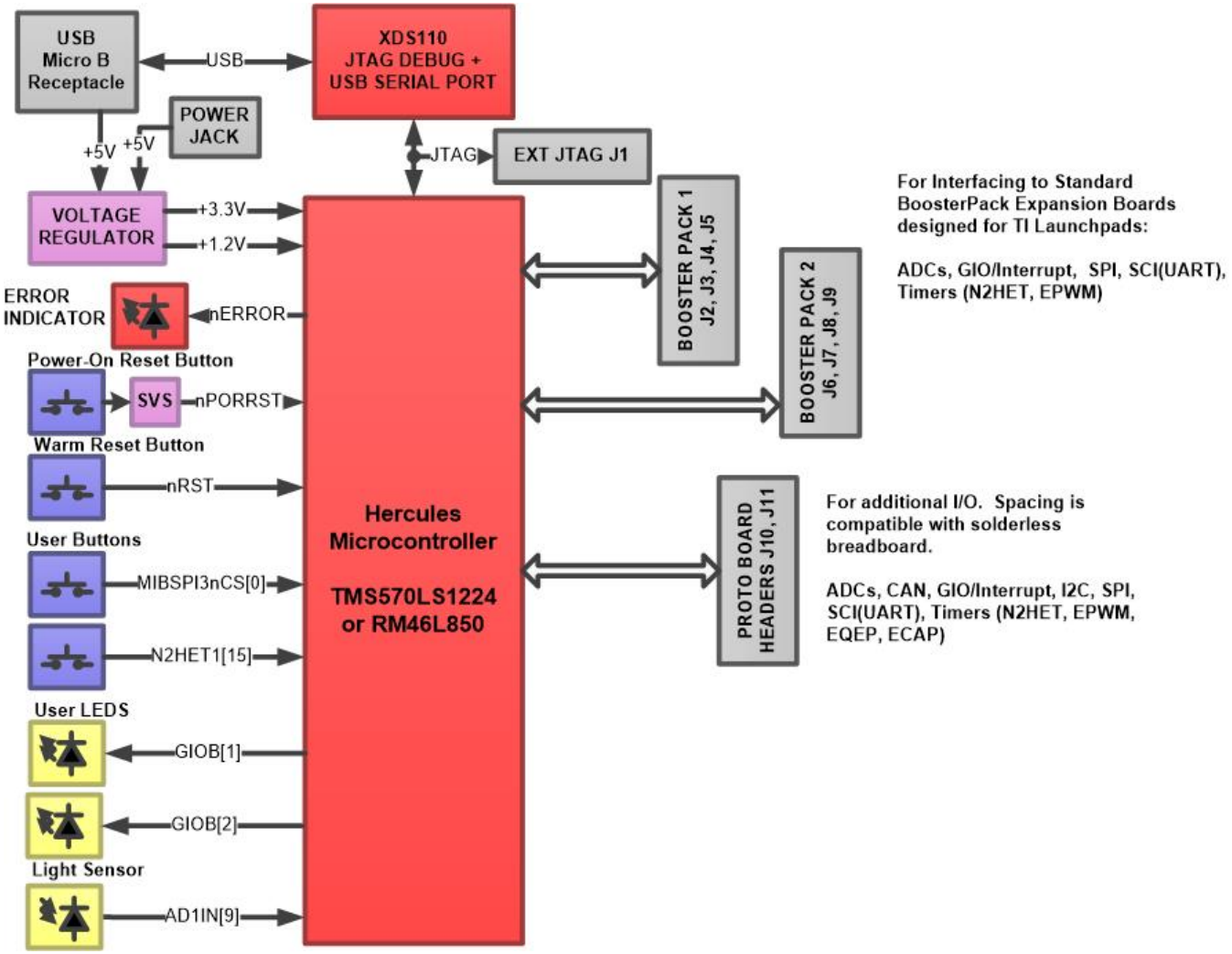


Figure 2. Hercules TMS570LS12224 / RM46L852 PGE LaunchPad Block Diagram

2.2 Hercules Microcontroller

2.2.1 TMS570LS1224 MCU (LAUNCHXL2-TMS57012)

The TMS570LS1224 device is a high-performance automotive-grade microcontroller family for safety systems. The safety architecture includes dual CPUs in lockstep, CPU and memory BIST logic, ECC on both the flash and the data SRAM, parity on peripheral memories, and loopback capability on peripheral I/Os.

The TMS570LS1224 device integrates the ARM® Cortex®-R4F floating-point CPU that offers an efficient 1.66 DMIPS/MHz, and has configurations that can run up to 180 MHz providing up to 298 DMIPS. The device supports the word-invariant big-endian [BE32] format.

The TMS570LS1224 device has 1.25MB of integrated flash and 192KB of data RAM with single-bit error correction and double-bit error detection. The flash memory on this device is a nonvolatile, electrically erasable and programmable memory, implemented with a 64-bit-wide data bus interface. The flash operates on a 3.3-V supply input (same level as I/O supply) for all read, program, and erase operations. When in pipeline mode, the flash operates with a system clock frequency of up to 180 MHz. The SRAM supports single-cycle read and write accesses in byte, halfword, word, and double-word modes throughout the supported frequency range.

For additional information, see the device product folder: http://www.ti.com/product/tms570ls1224.

2.2.2 RM46L852 MCU (LAUNCHXL2-RM46)

The RM46L852 device is a high-performance microcontroller family for safety systems. The safety architecture includes dual CPUs in lockstep, CPU and memory BIST logic, ECC on both the flash and the data SRAM, parity on peripheral memories, and loopback capability on peripheral I/Os.

The RM46L852 device integrates the ARM Cortex-R4F floating-point CPU that offers an efficient 1.66 DMIPS/MHz, and can run up to 220 MHz providing up to 365 DMIPS. The device supports the little-endian [LE] format.

The RM46L852 device has 1.25MB of integrated flash and 192KB of data RAM with single-bit error correction and double-bit error detection. The flash memory on this device is a nonvolatile, electrically erasable and programmable memory, implemented with a 64-bit-wide data bus interface. The flash operates on a 3.3-V supply input (same level as I/O supply) for all read, program, and erase operations. When in pipeline mode, the flash operates with a system clock frequency of up to 220 MHz. The SRAM supports single-cycle read and write accesses in byte, halfword, word, and double-word modes throughout the supported frequency range.

For additional information, see the device product folder: http://www.ti.com/product/rm46l852.

2.3 XDS110 JTAG Debugger and USB Serial Port

An XDS110 Debug Probe is integrated onto the to make getting started with the LaunchPad as seamless as possible. This emulator is supported by Code Composer Studio™ and other third party IDEs.

The XDS110 is a USB composite device consisting of two functions:

- TI XDS100 debug probe
- A USB Serial Port

Each function may be used independently, for example, it is possible to use the XDS110 debug probe with Code Composer Studio and at the same time connect to the USB Serial Port with any terminal program. The USB serial port provides a convenient method to interact with the Hercules microcontroller through the microcontroller LIN/SCI peripheral.

2.4 Voltage Regulator

The LaunchPad includes an on-board Low Dropout Voltage Regulator (LM26420XMHX/NOPB) that supplies the 3.3 V and 1.2 V power rails required by the MCU and XDS110 from the USB Bus. In normal operation, the LaunchPad operates as a USB bus powered device.

The on-board LDO is rated for up to 2A on the 3.3 V rail, but USB bus powered devices are limited to drawing less than 500 mA from the USB Bus. If BoosterPacks are added to the LaunchPad and more current is required by the booster packs than is specified in Table 1, then the LaunchPad should be converted so that it operates as a self-powered USB device. In this case, it is recommended to:

- Remove Jumper J6 so that the LaunchPad (when operating as a self powered device) does not back power the USB bus VBUS rail.
- Install a barrel jack in location J14
- Supply the LaunchPad with +5 V supply that is current limited to 1.5A.
- Use the +3.3 V IO rail provided by the LaunchPad on-board voltage regulator and available on J2 and J6 to power any interface logic between the MCU and booster packs.
- Avoid supplying a regulated +3.3 V rail from the BoosterPack as this would conflict with the LaunchPad on-board LDO regulator.

  Because some booster packs may require their own power supply and this may conflict with the on-board power supply of the LaunchPad, jumpers JP2, JP3, JP4, and JP5 allow the +3.3V and +5V connections between LaunchPad and Booster Packs to be disconnected if necessary to avoid a conflict.

2.5 LEDs

There are eight LEDs on the LaunchPad. Two of the LEDs are available for use by application code running on the MCU (D11, D12). Table 2 contains a summary of the LaunchPad LEDs and their purpose.

Table 2. LEDs

LED	Color	Driver	Description
LED1	Red	MCU nERROR Pin	Indicates Error Detected by MCU ESM Module
LED2	Green	GIOB[1]	General Purpose Indicator LED. Drive pin to logic high to light LED.
LED3	Green	GIOB[2]	General Purpose Indicator LED. Drive pin to logic high to light LED.
LED4	Green	+3.3V	+3.3 V Power Indicator
LED5	Green	+5 V	+5 V Power Indicator
LED7	Green	XDS110	XDS110 Status
LED8	Green		

2.6 Push Buttons

There are four pushbutton switches on the LaunchPad, described in Table 3. There are many subtle differences between a warm reset (S2) and power on reset (S3) but the main difference involves certain error and reset status flags that are only cleared during a power on reset.

Table 3. Push Button Switches

Switch	MCU Pin	Description
S1	nPORRST	Pressing the button asserts a power on reset (nPORRST).
S2	nRST	Pressing the button asserts a warm reset (nRST).
S3	MIBSPI3NCS_0/AD2EVT/GIOB_2/EQEP1I	General Purpose User Input. Pin reads '0' when pressed, '1' when released.
S4	N2HET1_15/MIBSPI1NCS_4/ECAP1	

2.7 Light Sensor

To demonstrate the capabilities of the TMS570LS1224 / RM42 A/D Converter, the LaunchPad includes an Ambient Light Sensor (Vishay TEMT6000). The light sensor is tied to AD1IN[6].

2.8 Oscillator Failure Jumper

The MCU is capable of detecting a failure on its external oscillator and of automatically switching to an on chip oscillator so that the MCU may continue to operate in the event of such a failure. To demonstrate this capability, a shunt installed on jumper JP1 will short the oscillator to ground causing it to 'fail'. This jumper should be removed for normal operation.

2.9 Booster Pack Headers

The LaunchPad supports two Booster Pack sites through headers J2, J3, J4, and J5 (Booster Pack #1) and J6, J7, J8, and J9 (Booster Pack 2). The pinout of each header is described in Table 4 - Table 11.

The official TI list of BoosterPacks can be found at www.ti.com/boosterpacks.

The ADC inputs on the BoosterPack are limited to the range of 0 V_{DC} - +3.3 V_{DC} by default; however resistors R1, R2, R3, R4 on the LaunchPad can be arranged to allow for an ADC input range of 0 V_{DC} - +5 V_{DC}.

All of the digital I/O on the BoosterPack (and Expansion) headers are 3.3 V LVCMOS. A transceiver is usually required before connecting to a serial bus (ex. CAN or RS-232). There are no transceivers on the LaunchPad itself.

Table 4. Booster Pack Site 1 - J2 Connections

Header	Header Pin	MCU	MCU Pin	Description
J2	1			+3.3 V Booster Pack - Default Connection to LaunchPad +3.3 V When JP4 Is Installed
J2	2	U1	58	AD1IN[16]/AD2IN[0]
J2	3	U1	38	N2HET1[6]/SCIRX/EPWM5A
J2	4	U1	39	N2HET1[13]/SCITX/EPWM5B
J2	5	U1	22	GIOA[7]/N2HET2[6]/EPWM2A
J2	6	U1	59	AD1IN[17]/AD2IN[1]
J2	7	U1	53	MIBSPI3CLK/AWM_EXT_SEL[1]/EQEP1A
J2	8	U1	16	GIOA[6]/N2HET2[4]/EPWM1B
J2	9	U1	36	N2HET1[4]/EPWM4B
J2	10	U1	35	N2HET1[9]/N2HET2[16]/EPWM7A

Table 5. Booster Pack Site 1 - J3 Connections

Header	Header Pin	MCU	MCU Pin	Description
J3	1			+5V Booster Pack - Default Connection to LaunchPad +5V When JP3 Is Installed
J3	2			GND
J3	3	U1	60	AD1IN[0]
J3	4	U1	61	AD1IN[7]
J3	5	U1	62	AD1IN[18]/AD2IN[2]
J3	6	U1	63	AD1IN[19]/AD2IN[3]
J3	7	U1	64	AD1IN[20]/AD2IN[4]
J3	8	U1	65	AD1IN[21]/AD2IN[5]

Table 6. Booster Pack Site 1 - J4 Connections

Header	Header Pin	MCU	MCU Pin	Description
J4	1	U1	141	N2HET1[20]/EPWM6B
J4	2	U1	140	N2HET1[18]/EPWM6A
J4	3	U1	139	N2HET1[16]/EPWM1SYNCI/EPWM1SYNCO
J4	4	U1	127	N2HET1[30]/MII_RX_DV/EQEP2S
J4	5	U1	125	N2HET1[14]
J4	6	U1	124	N2HET1[12]/MII_CRS/RMII_CRS_DV
J4	7	U1	14	GIOA[5]/EXTCLKIN/EPWM1A
J4	8	U1	9	GIOA[2]/N2HET2[0]/EQEP2I
J4	9	U1	5	GIOA[1]
J4	10	U1	2	GIOA[0]

Table 7. Booster Pack Site 1 - J5 Connections

Header	Header Pin	MCU	MCU Pin	Description
J5	1			GND
J5	2	U1	15	N2HET1[22]
J5	3	U1	37	MIBSPI3NCS[1]/N2HET1[25]/MDCLK
J5	4	U1	1	GIOB[3]
J5	5	U1	116	HERCULES_NRST
J5	6	U1	52	MIBSPI3SIMO/AWM_EXT_SEL[0]/ECAP3
J5	7	U1	51	MIBSPI3SOMI/AWM_EXT_ENA/ECAP2
J5	8	U1	4	MIBSPI3NCS[2]/I2C_SDA/N2HET1[27]/NTZ2
J5	9	U1	3	MIBSPI3NCS[3]/I2C_SCL/N2HET1[29]/NTZ1
J5	10	U1	142	GIOB[2]

Table 8. Booster Pack Site 2 - J6 Connections

Header	Header Pin	MCU	MCU Pin	Description
J6	1			+3.3 V Booster Pack - Default Connection to LaunchPad +3.3 V When JP4 Is Installed
J6	2	U1	70	AD1IN[9]/AD2IN[9]
J6	3	U1	131	HERCULES_LIN1_RXD
J6	4	U1	132	HERCULES_LIN1_TXD
J6	5	U1	55	MIBSPI3NCS[0]/AD2EVT/GIOB[2]/EQEP1I
J6	6	U1	71	AD1IN[1]
J6	7	U1	95	MIBSPI1CLK
J6	8	U1	54	MIBSPI3NENA/MIBSPI3NCS[5]/N2HET1[31]/EQEP1B
J6	9	U1	91	N2HET1[24]/MIBSPI1NCS[5]/MII_RXD[0]/RMII_RXD[0]
J6	10	U1	92	N2HET1[26]/MII_RXD[1]/RMII_RXD[1]

Table 9. Booster Pack Site 2 - J7 Connections

Header	Header Pin	MCU	MCU Pin	Description
J7	1			+5 V Booster Pack - Default Connection to LaunchPad +5 V When JP5 Is Installed
J7	2			GND
J7	3	U1	72	AD1IN[10]/AD2IN[10]
J7	4	U1	73	AD1IN[2]
J7	5	U1	74	AD1IN[3]
J7	6	U1	75	AD1IN[11]/AD2IN[11]
J7	7	U1	76	AD1IN[4]
J7	8	U1	77	AD1IN[12]/AD2IN[12]

Table 10. Booster Pack Site 2 - J8 Connections

Header	Header Pin	MCU	MCU Pin	Description
J8	1	U1	118	N2HET1[10]/MII_TX_CLK/MII_TX_AVCLK4/NTZ3
J8	2	U1	107	N2HET1[28]/MII_RXCLK/RMII_REFCLK/MII_RX_AVCLK4
J8	3	U1	106	N2HET1[8]/MIBSPI1SIMO[1]/MII_TXD[3]
J8	4	U1	96	MIBSPI1NENA/N2HET1[23]/MII_RXD[2]/ECAP4
J8	5	U1	97	MIBSPI5NENA/MII_RXD[3]/MIBSPI5SOMI[1]/ECAP5
J8	6	U1	6	N2HET1[11]/MIBSPI3NCS[4]/N2HET2[18]/EPWM1SYNCO
J8	7	U1	133	GIOB[1]
J8	8	U1	126	GIOB[0]
J8	9	U1	86	AD1EVT/MII_RX_ER/RMII_RX_ER
J8	10	U1	100	MIBSPI5CLK/MII_TXEN/RMII_TXEN

Table 11. Booster Pack Site 2 - J9 Connections

Header	Header Pin	MCU	MCU Pin	Description
J9	1			GND
J9	2	U1	23	N2HET1[1]/SPI4NENA/N2HET2[8]/EQEP2A
J9	3	U1	105	MIBSPI1NCS[0]/MIBSPI1SOMI[1]/MII_TXD[2]/ECAP6
J9	4	U1	99	MIBSPI5SIMO[0]/MII_TXD[1]/RMII_TXD[1]/MIBSPI5SOMI[2]
J9	5	U1	116	HERCULES_NRST
J9	6	U1	93	MIBSPI1SIMO
J9	7	U1	94	MIBSPI1SOMI
J9	8	U1	130	MIBSPI1NCS[1]/N2HET1[17]/MII_COL/EQEP1S
J9	9	U1	40	MIBSPI1NCS[2]/N2HET1[19]/MDIO
J9	10	U1	98	MIBSPI5SOMI[0]/MII_TXD[0]/RMII_TXD[0]

2.10 Proto Board Headers

The MCU IO pins that are not routed to the Booster Pack headers are available on proto board headers J10 and J11. These are not installed by default and are each a single row of 50 pins on 0.100" pitch. The orientation layout of these signals allows a row of 0.100", 0.039" square post pin strips to be soldered into the LaunchPad so that it can be plugged into a 0.100" pitch solder-less breadboard for easy prototyping. Table 12 and Table 13 list the signals available on the prototyping headers.

Table 12. Proto Board Header J10 Connections

Header	Header Pin	MCU	MCU Pin	Description
J10	1			+5 V
J10	2			GND
J10	3			+3V3
J10	4			GND
J10	5	U1	141	N2HET1[20]/EPWM6B
J10	6	U1	140	N2HET1[18]/EPWM6A
J10	7	U1	139	N2HET1[16]/EPWM1SYNCI/EPWM1SYNCO
J10	8	U1	133	GIOB[1]
J10	9	U1	132	HERCULES_LIN1_TXD
J10	10	U1	131	HERCULES_LIN1_RXD
J10	11	U1	130	MIBSPI1NCS[1]/N2HET1[17]/MII_COL/EQEP1S
J10	12	U1	129	DCAN2RX
J10	13	U1	128	DCAN2TX
J10	14	U1	127	N2HET1[30]/MII_RX_DV/EQEP2S
J10	15	U1	126	GIOB[0]
J10	16			GND
J10	17	U1	125	N2HET1[14]
J10	18	U1	124	N2HET1[12]/MII_CRS/RMII_CRS_DV
J10	19			ECLK1T
J10	20	U1	118	N2HET1[10]/MII_TX_CLK/MII_TX_AVCLK4/NTZ3
J10	21	U1	117	NERROR
J10	22	U1	116	HERCULES_NRST
J10	23	U1	107	N2HET1[28]/MII_RXCLK/RMII_REFCLK/MII_RX_AVCLK4
J10	24	U1	106	N2HET1[8]/MIBSPI1SIMO[1]/MII_TXD[3]
J10	25			GND
J10	26	U1	105	MIBSPI1NCS[0]/MIBSPI1SOMI[1]/MII_TXD[2]/ECAP6
J10	27	U1	100	MIBSPI5CLK/MII_TXEN/RMII_TXEN
J10	28	U1	99	MIBSPI5SIMO[0]/MII_TXD[1]/RMII_TXD[1]/MIBSPI5SOMI[2]
J10	29	U1	98	MIBSPI5SOMI[0]/MII_TXD[0]/RMII_TXD[0]
J10	30	U1	97	MIBSPI5NENA/MII_RXD[3]/MIBSPI5SOMI[1]/ECAP5
J10	31	U1	96	MIBSPI1NENA/N2HET1[23]/MII_RXD[2]/ECAP4
J10	32	U1	95	MIBSPI1CLK
J10	33	U1	94	MIBSPI1SOMI
J10	34			GND
J10	35	U1	93	MIBSPI1SIMO
J10	36	U1	92	N2HET1[26]/MII_RXD[1]/RMII_RXD[1]
J10	37	U1	91	N2HET1[24]/MIBSPI1NCS[5]/MII_RXD[0]/RMII_RXD[0]
J10	38	U1	90	DCAN1RX
J10	39	U1	89	DCAN1TX
J10	40	U1	86	AD1EVT/MII_RX_ER/RMII_RX_ER
J10	41	U1	85	AD1IN[15]/AD2IN[15]

Table 12. Proto Board Header J10 Connections (continued)

Header	Header Pin	MCU	MCU Pin	Description
J10	42	U1	84	AD1IN[23]/AD2IN[7]
J10	43	U1	83	AD1IN[8]/AD2IN[8]
J10	44	U1	82	AD1IN[14]/AD2IN[14]
J10	45	U1	81	AD1IN[22]/AD2IN[6]
J10	46	U1	79	AD1IN[13]/AD2IN[13]
J10	47	U1	78	AD1IN[5]
J10	48	U1	80	AD1IN[6]
J10	49	U1	77	AD1IN[12]/AD2IN[12]
J10	50	U1	75	AD1IN[11]/AD2IN[11]

Table 13. Proto Board Header J11 Connections

Header	Header Pin	MCU	MCU Pin	Description
J11	1			+5 V
J11	2			GND
J11	3			+3V3
J11	4			GND
J11	5	U1	142	GIOB[2]
J11	6	U1	1	GIOB[3]
J11	7	U1	2	GIOA[0]
J11	8	U1	3	MIBSPI3NCS[3]/I2C_SCL/N2HET1[29]/NTZ1
J11	9	U1	4	MIBSPI3NCS[2]/I2C_SDA/N2HET1[27]/NTZ2
J11	10	U1	5	GIOA[1]
J11	11	U1	6	N2HET1[11]/MIBSPI3NCS[4]/N2HET2[18]/EPWM1SYNCO
J11	12	U1	9	GIOA[2]/N2HET2[0]/EQEP2I
J11	13	U1	12	DCAN3RX
J11	14			GND
J11	15	U1	13	DCAN3TX
J11	16	U1	14	GIOA[5]/EXTCLKIN/EPWM1A
J11	17	U1	15	N2HET1[22]
J11	18	U1	16	GIOA[6]/N2HET2[4]/EPWM1B
J11	19	U1	22	GIOA[7]/N2HET2[6]/EPWM2A
J11	20	U1	25	N2HET1[0]/SPI4CLK/EPWM2B
J11	21	U1	23	N2HET1[1]/SPI4NENA/N2HET2[8]/EQEP2A
J11	22	U1	24	N2HET1[3]/SPI4NCS[0]/N2HET2[10]/EQEP2B
J11	23			GND
J11	24	U1	30	N2HET1[2]/SPI4SIMO/EPWM3A
J11	25	U1	31	N2HET1[5]/SPI4SOMI/N2HET2[12]/EPWM3B
J11	26	U1	32	MIBSPI5NCS[0]/EPWM4A
J11	27	U1	36	N2HET1[4]/EPWM4B
J11	28	U1	33	N2HET1[7]/N2HET2[14]/EPWM7B
J11	29	U1	35	N2HET1[9]/N2HET2[16]/EPWM7A
J11	30	U1	37	MIBSPI3NCS[1]/N2HET1[25]/MDCLK
J11	31	U1	40	MIBSPI1NCS[2]/N2HET1[19]/MDIO
J11	32			GND
J11	33	U1	38	N2HET1[6]/SCIRX/EPWM5A
J11	34	U1	39	N2HET1[13]/SCITX/EPWM5B

Table 13. Proto Board Header J11 Connections (continued)

Header	Header Pin	MCU	MCU Pin	Description
J11	35	U1	41	N2HET1[15]/MIBSPI1NCS[4]/ECAP1
J11	36	U1	51	MIBSPI3SOMI/AWM_EXT_ENA/ECAP2
J11	37	U1	52	MIBSPI3SIMO/AWM_EXT_SEL[0]/ECAP3
J11	38	U1	53	MIBSPI3CLK/AWM_EXT_SEL[1]/EQEP1A
J11	39	U1	54	MIBSPI3NENA/MIBSPI3NCS[5]/N2HET1[31]/EQEP1B
J11	40	U1	55	MIBSPI3NCS[0]/AD2EVT/GIOB[2]/EQEP1I
J11	41	U1	58	AD1IN[16]/AD2IN[0]
J11	42	U1	59	AD1IN[17]/AD2IN[1]
J11	43	U1	62	AD1IN[18]/AD2IN[2]
J11	44	U1	63	AD1IN[19]/AD2IN[3]
J11	45	U1	64	AD1IN[20]/AD2IN[4]
J11	46	U1	65	AD1IN[21]/AD2IN[5]
J11	47	U1	66	ADREFHI
J11	48	U1	67	ADREFLO
J11	49	U1	70	AD1IN[9]/AD2IN[9]
J11	50	U1	72	AD1IN[10]/AD2IN[10]

2.11 External JTAG Header

Header J1 allows the use of an external (presumably faster or more convenient) JTAG controller with the LaunchPad, in place of the on-board XDS100v2.

This header is not populated. The footprint supports a 20-pin TI JTAG header. You can install a header such as the Samtec FTR-110-51-S-D-06 in this footprint. Make sure that pin 6 of the header you install is removed as this is used as a key.

The LaunchPad on-board XDS110 will detect the external emulator by sensing that pin J1-8 is pulled to ground and this will cause it to automatically 3-state its drive of the MCU JTAG lines and allow the external JTAG emulator to take control of the MCU.

Table 14. External JTAG Debug Header J1

Header	Header Pin	MCU	MCU Pin	Description
J1	1	U1	108	TMS
J1	2	U1	109	NTRST
J1	3	U1	110	TDI
J1	4			GND
J1	5			+3V3
J1	7	U1	111	TDO
J1	8			EXTERNAL_DEBUG (XDS110 Senses External Debugger through This Pin)
J1	9	U1	113	RTCK
J1	10			GND
J1	11	U1	112	TCK
J1	12			GND
J1	15			MR_PB (Tied to Power On Reset Push Button)
J1	16			GND
J1	20			GND

3 Software Development

3.1 Getting Started Demonstration Programs

The LaunchPad wiki pages contain a few simple projects that help you get started with software development these platforms. The wiki pages are: http://processors.wiki.ti.com/index.php/LAUNCHXL2-TMS57012 for LAUNCHXL2-TMS570LS012 and http://processors.wiki.ti.com/index.php/LAUNCHXL2-RM46 for LAUNCHXL2-RM46

3.2 Hardware Abstraction Layer Code Generator for Hercules MCUs (HALOGEN)

HALOGEN provides a graphical user interface that allows the user to configure peripherals, interrupts, clocks, and other microcontroller parameters. Once the device is configured, the user can generate peripheral initialization and driver code, which can be imported into CCS, IAR Workbench, or Keil uVision.

HALCoGen is available from http://www.ti.com/tool/halcogen. The files that are generated by HalCoGen are distributed under an open-source (BSD style) license.

3.3 Code Composer Studio

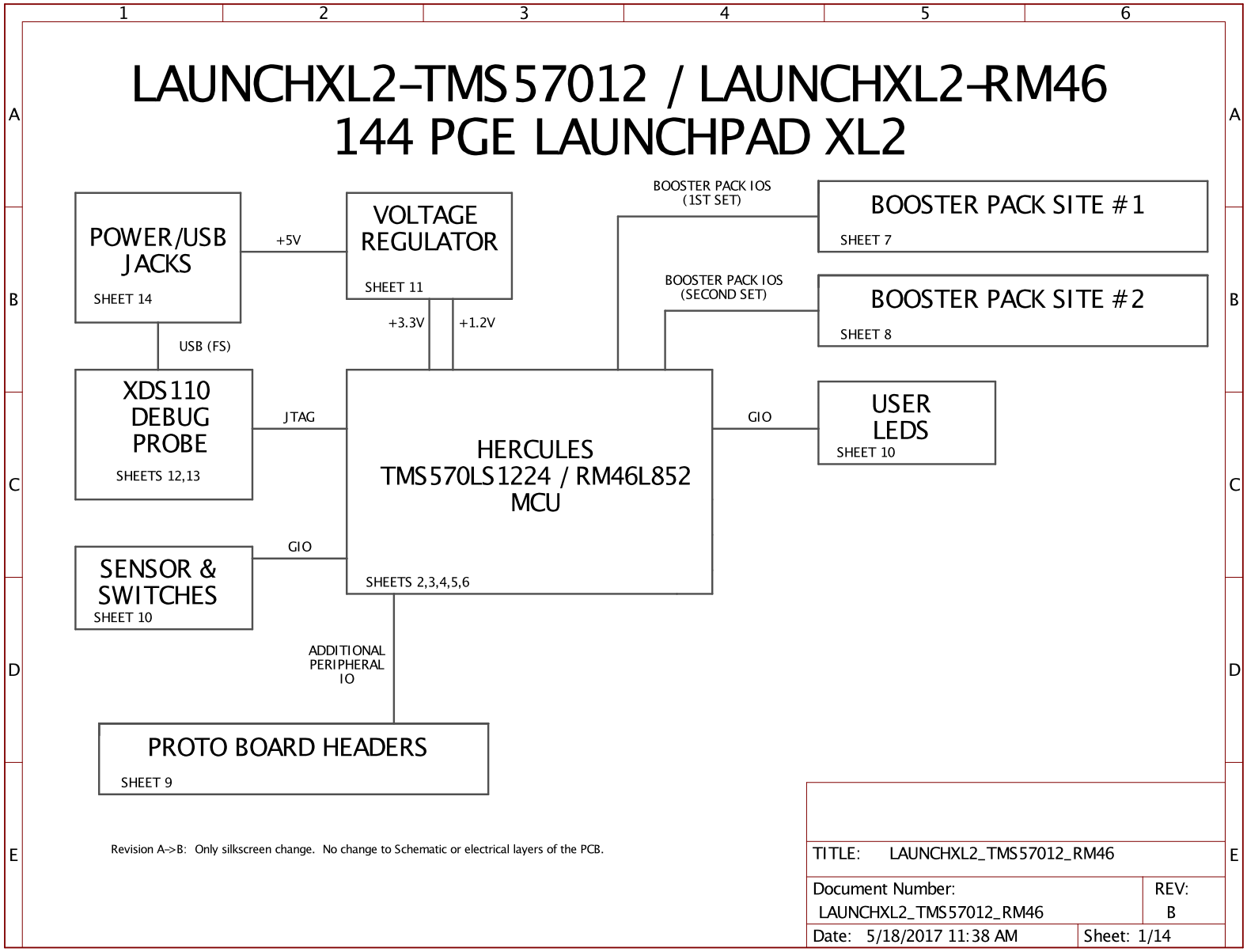
Code Composer Studio includes an optimizing C/C++ compiler, source code editor, project build environment, debugger, profiler, and many other features. It is available for download from http://www.ti.com/tool/ccstudio-safety.

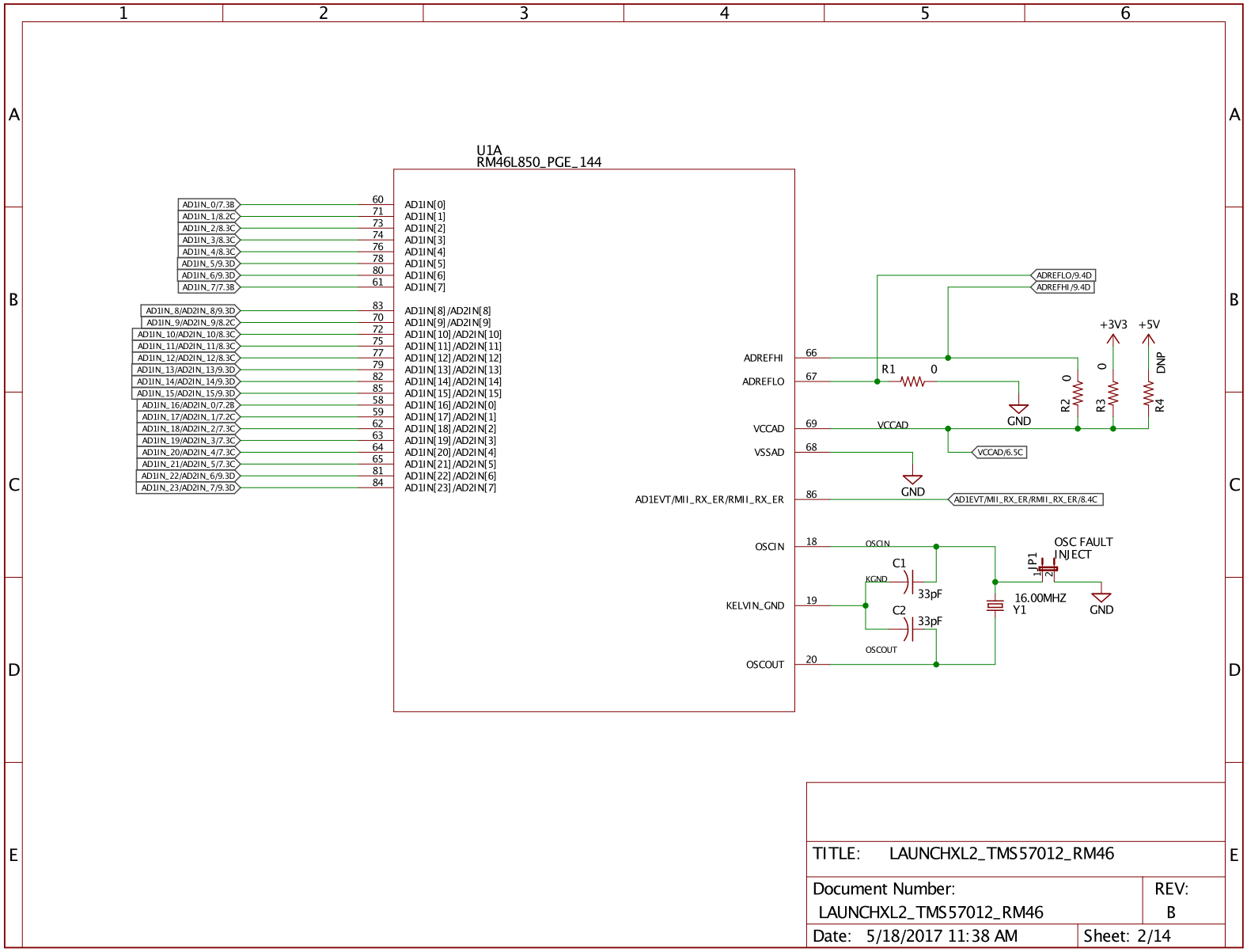
3.4 Other Tools and Software

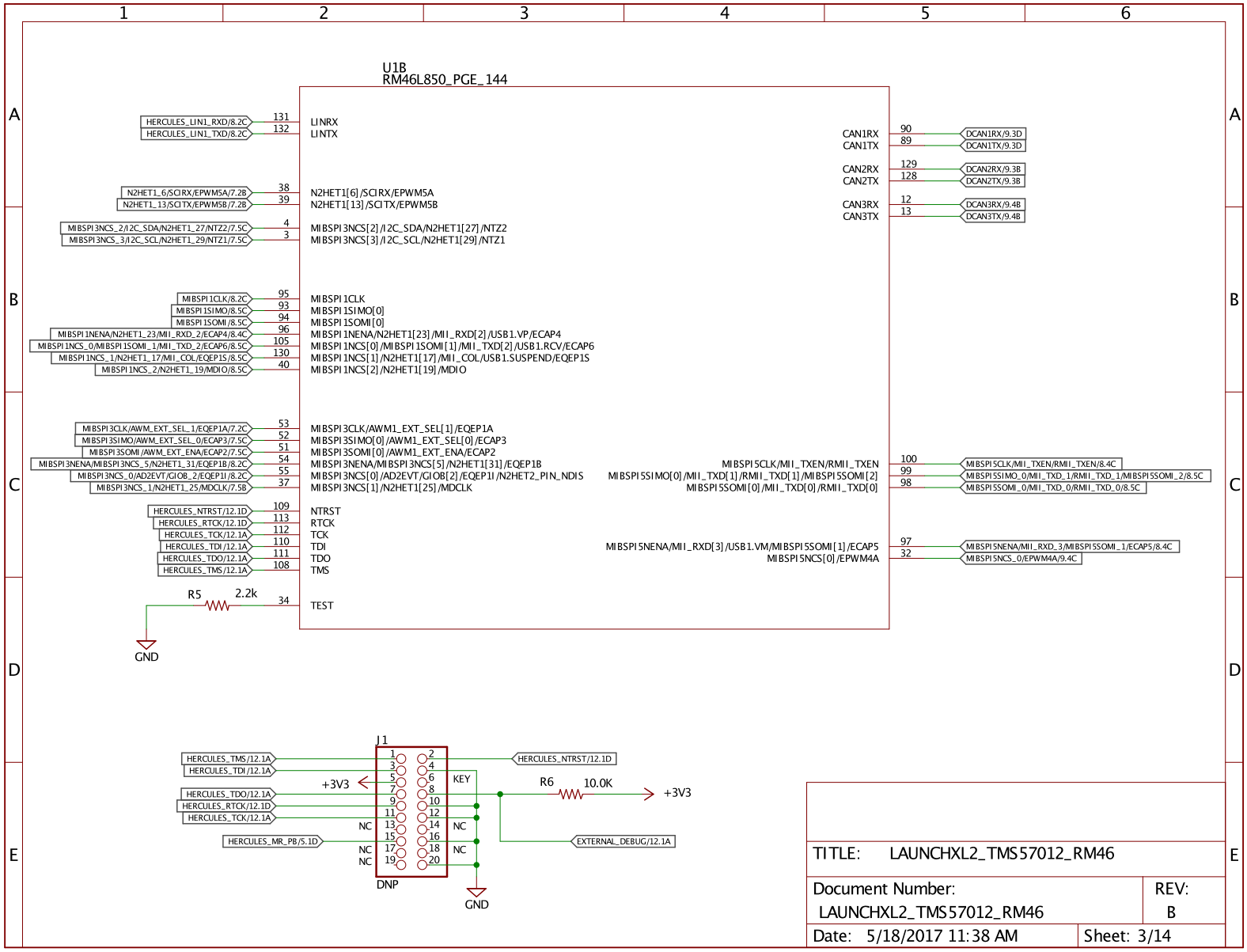
Other available tools and software for Hercules MCUs can be found on the "Tools & Software" tab in the MCU Product folder, or http://www.ti.com/lsds/ti/microcontrollers_16-bit_32-bit/c2000_performance/safety/tools_software.page.

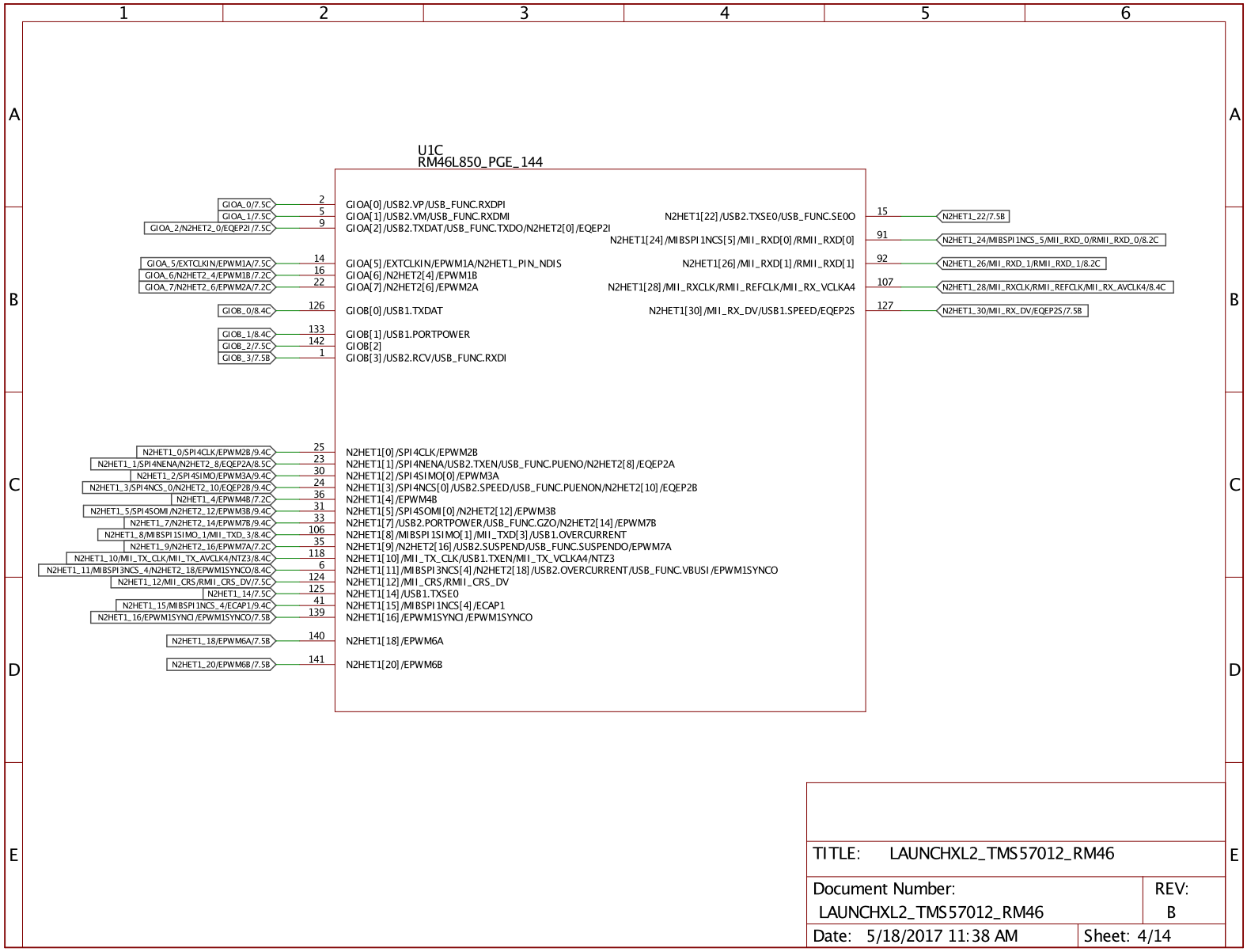
Schematics

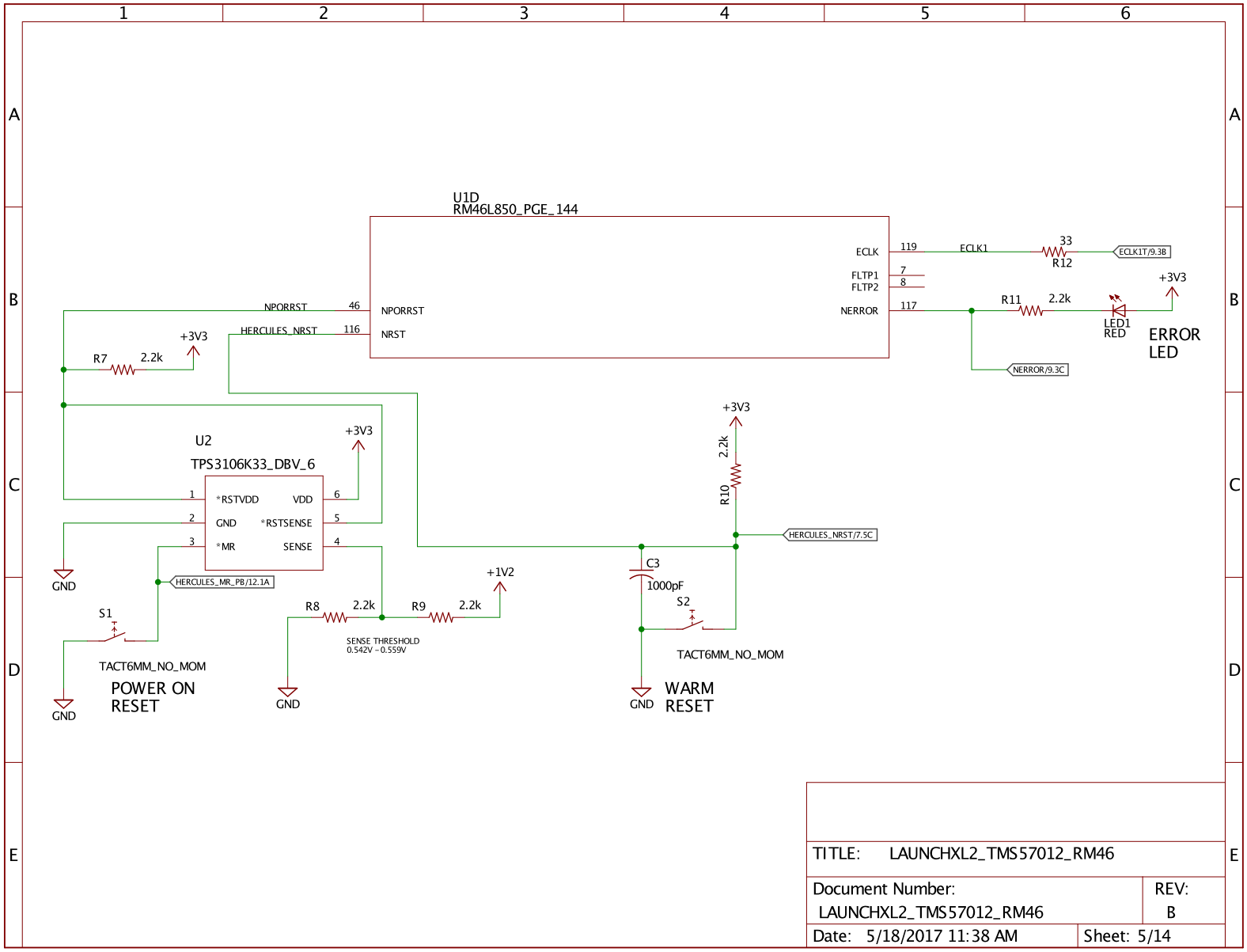
A.1 Schematics

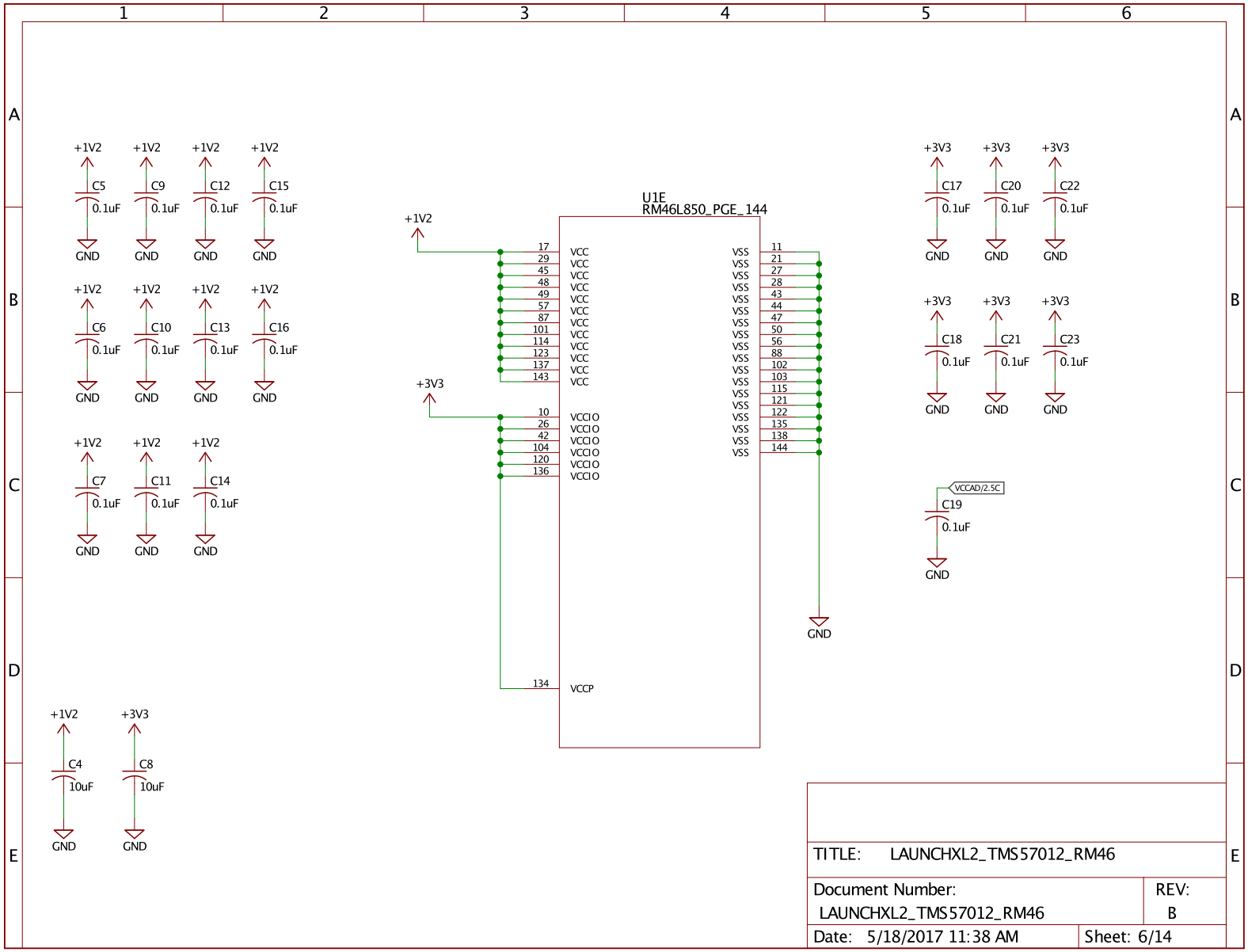


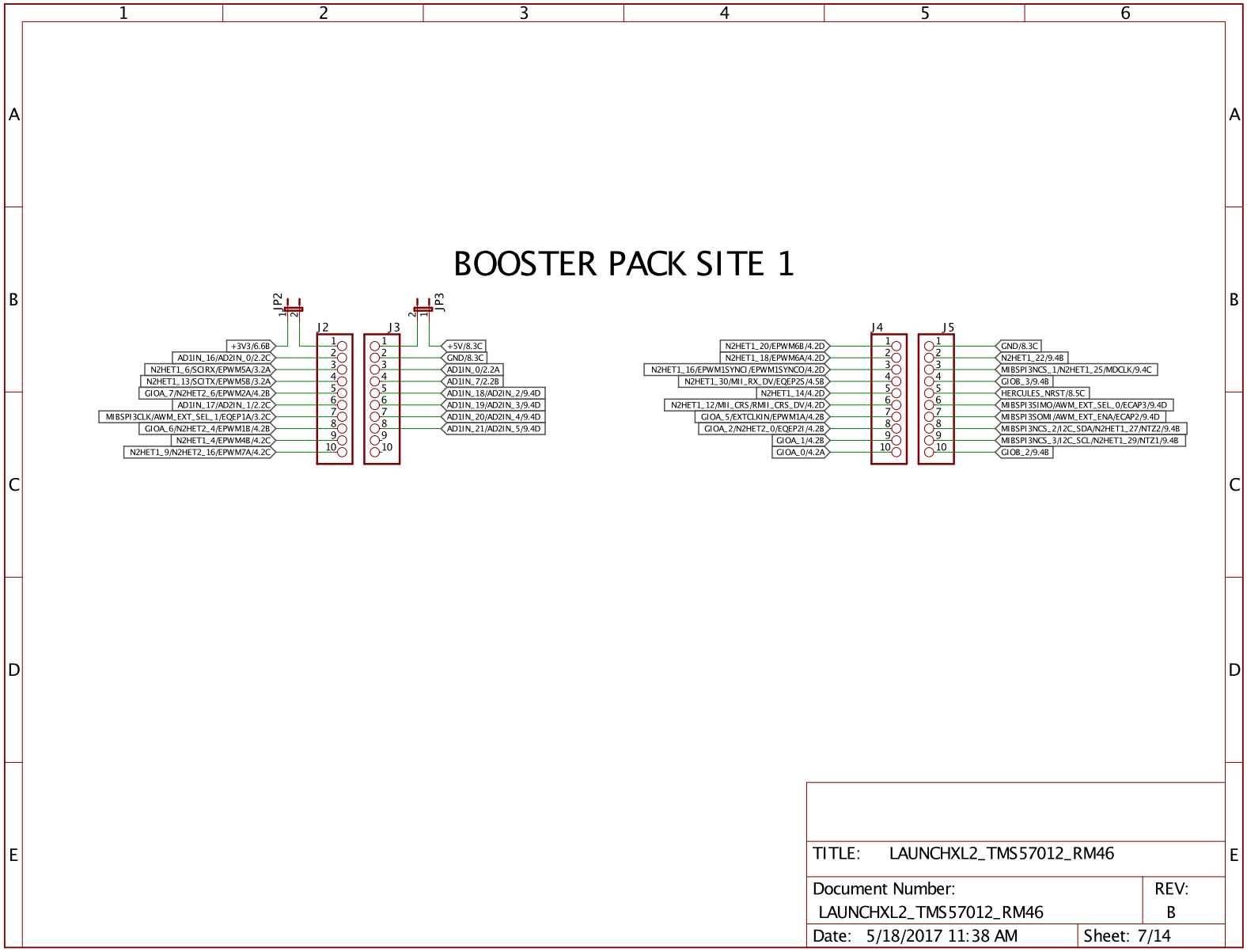


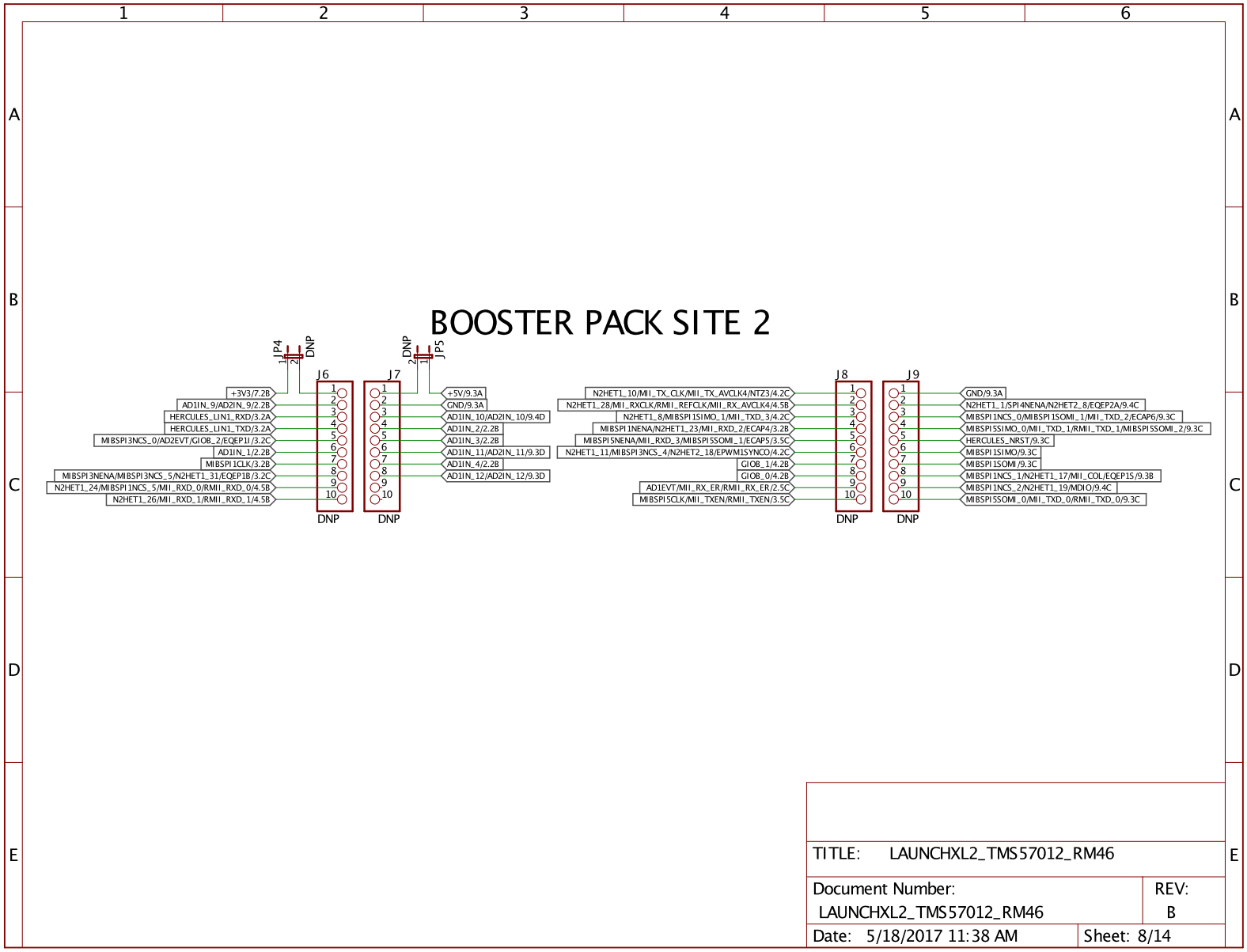




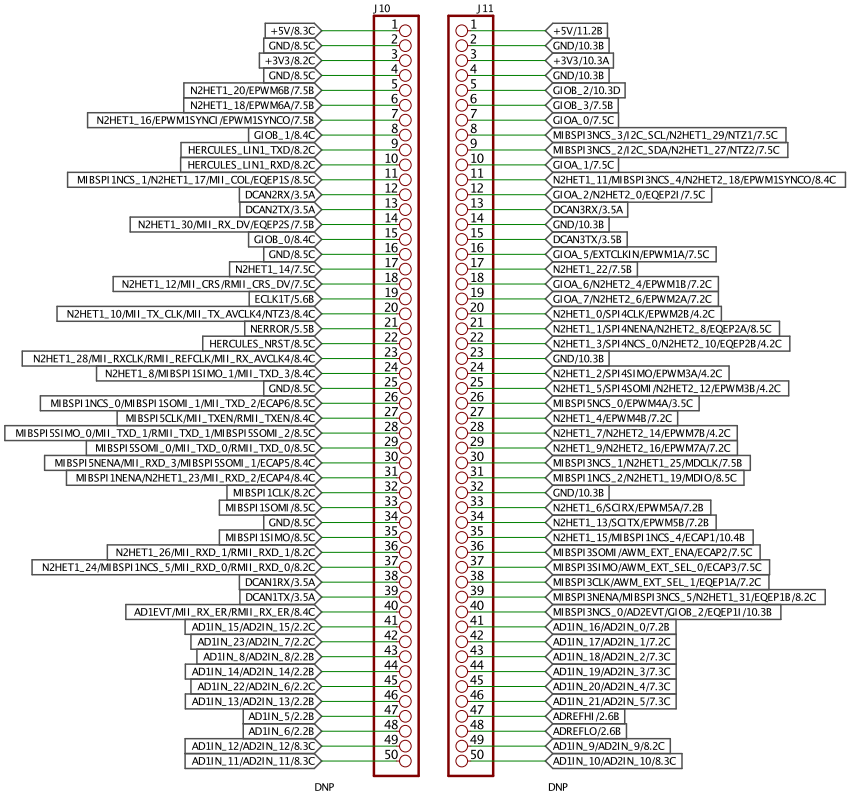








PROTO BOARD HEADERS



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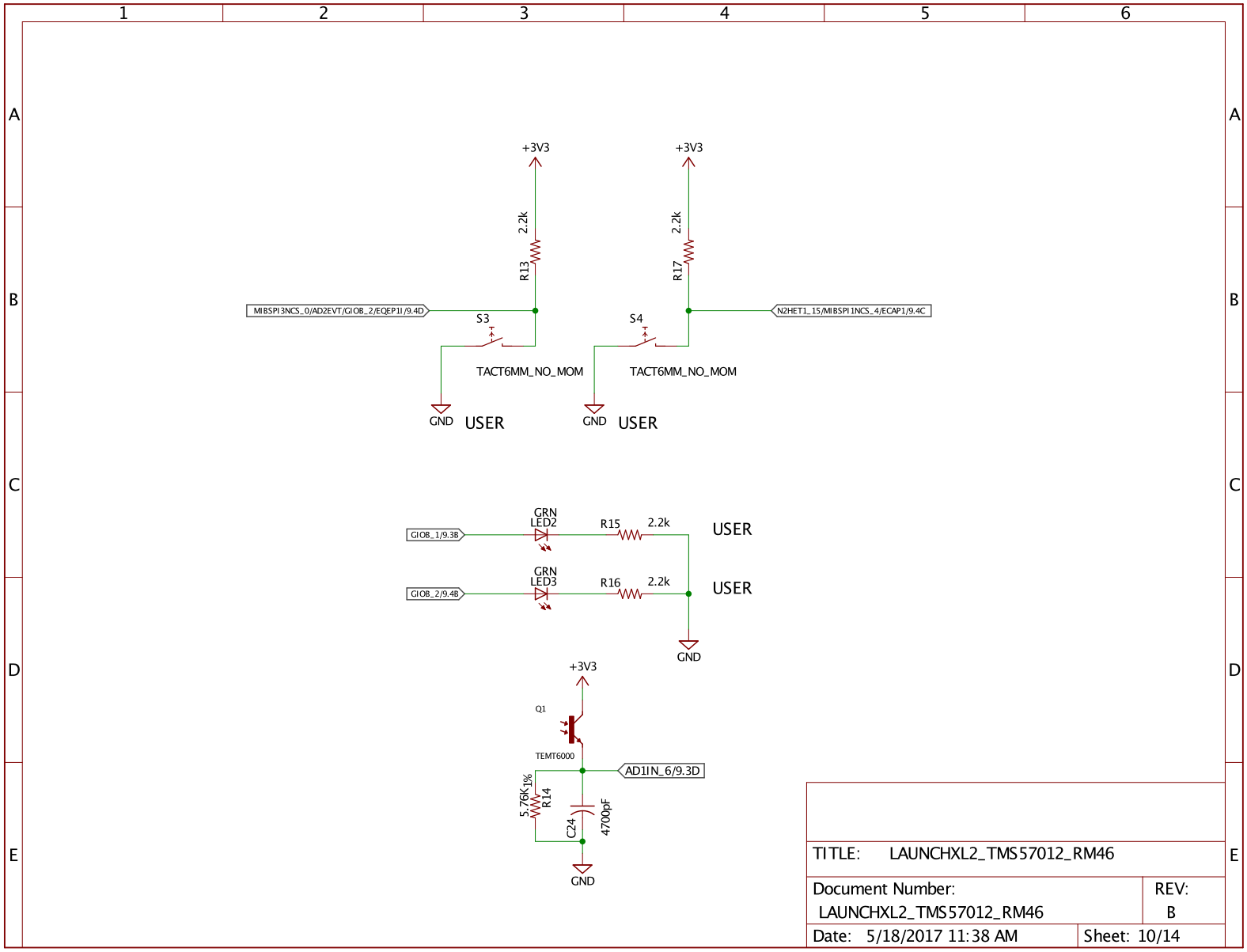

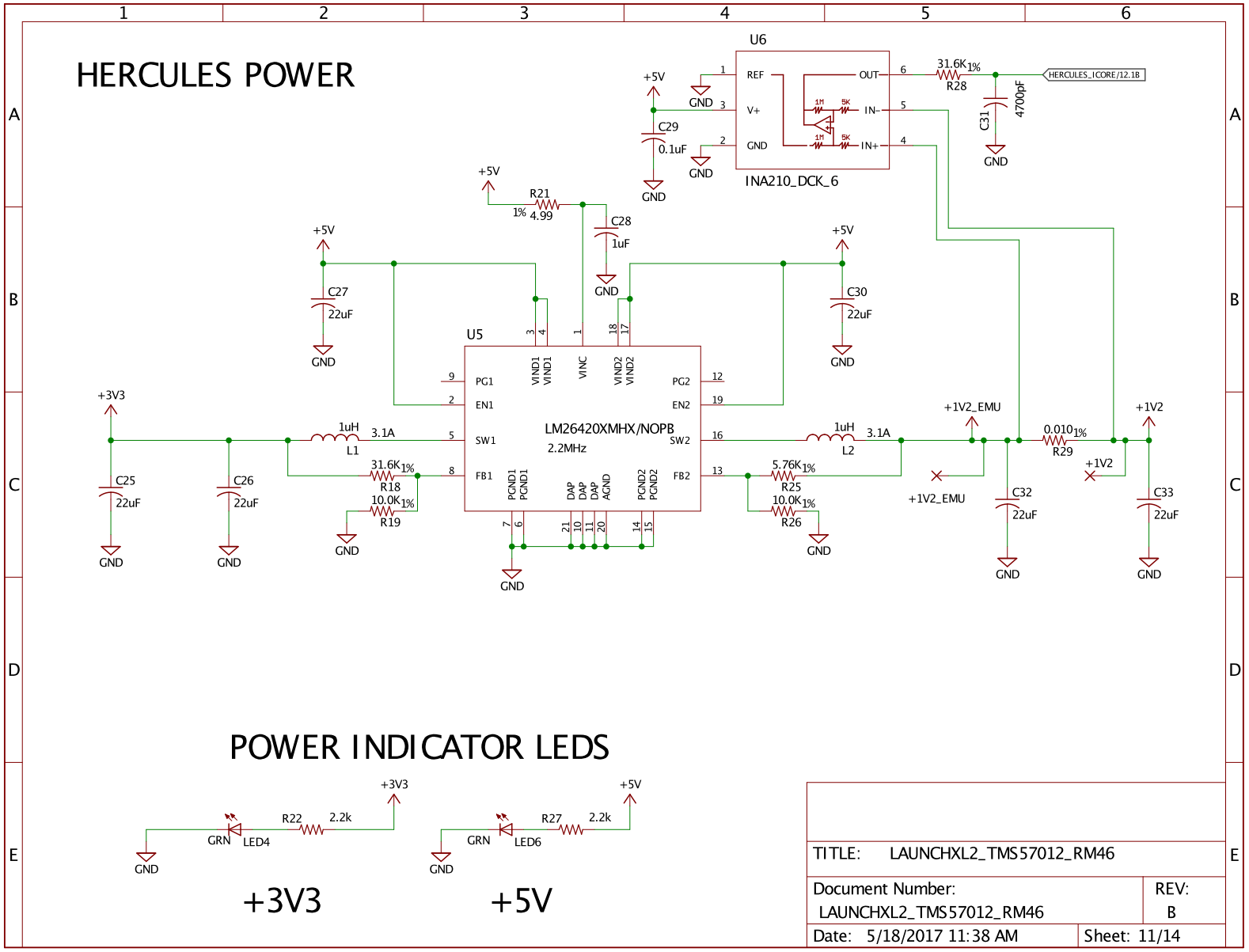

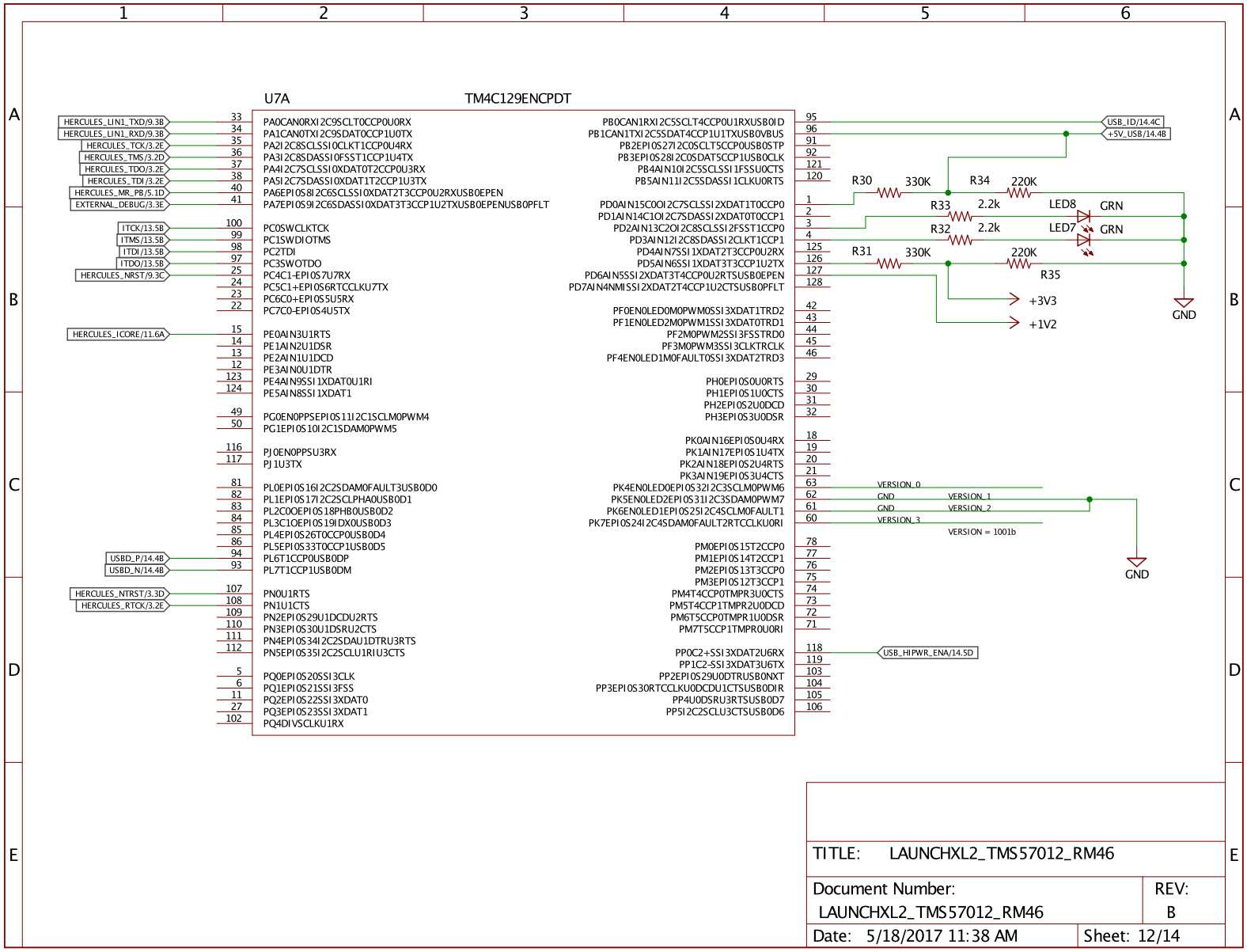

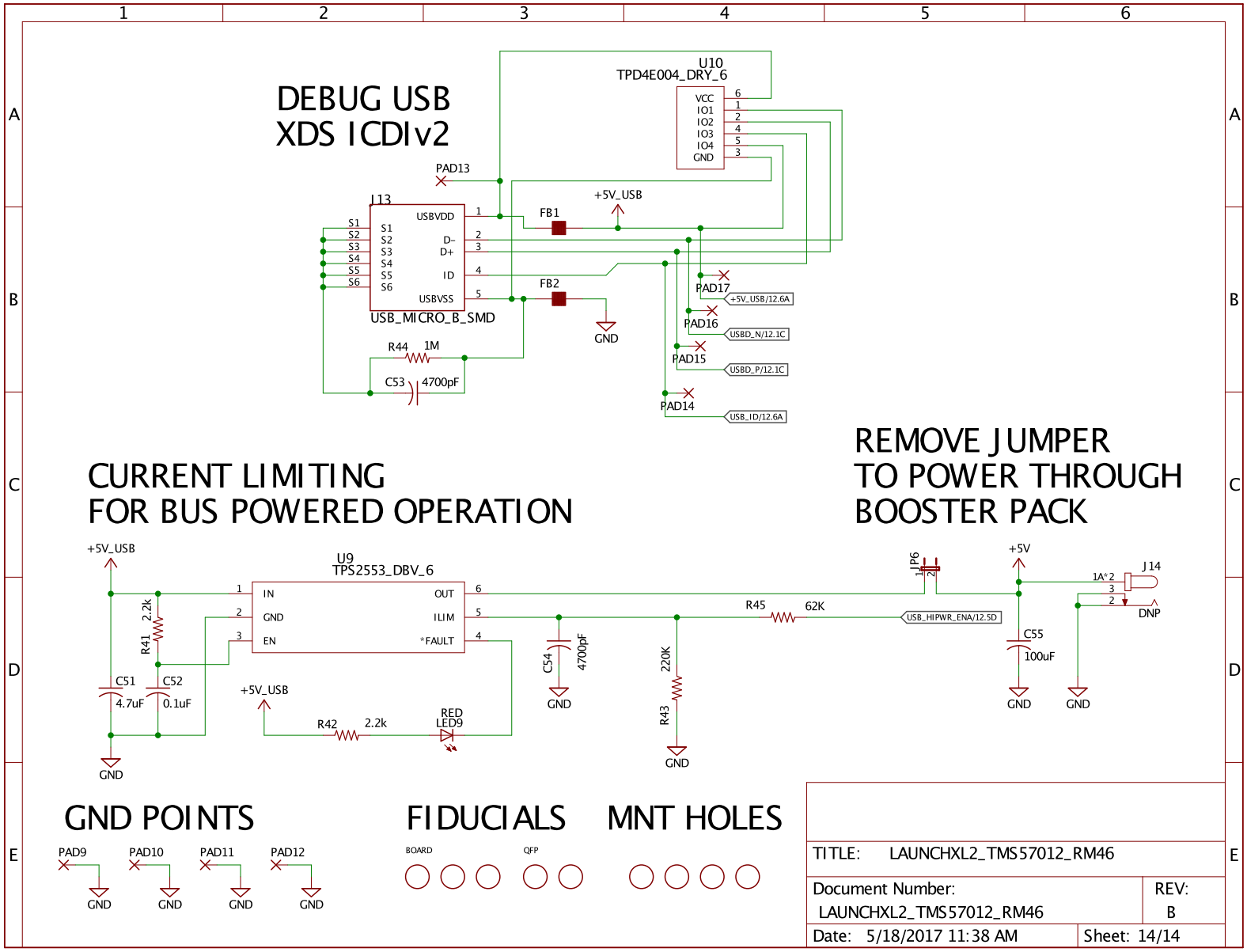

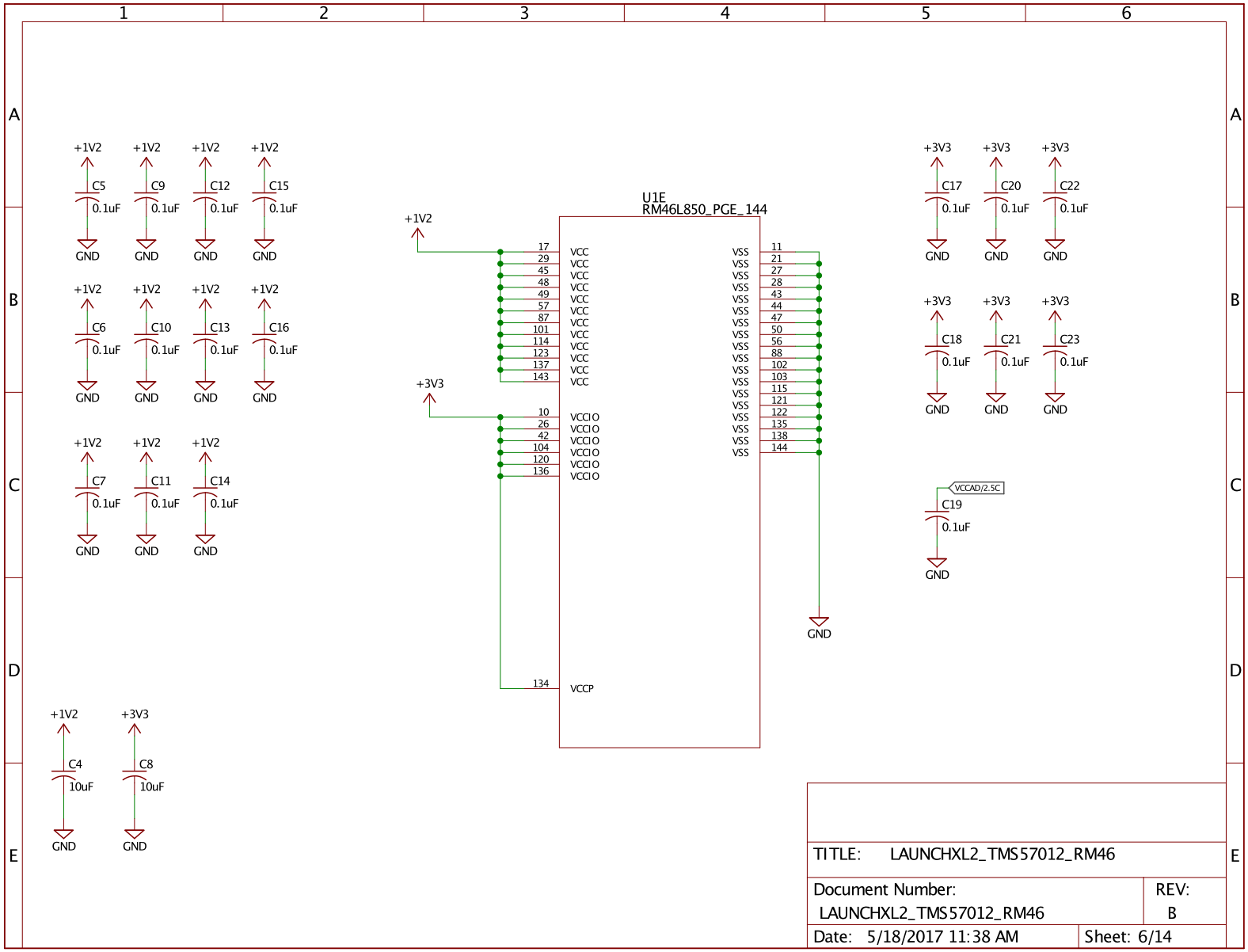

Design File Sources

B.1 Design File Sources

Design file sources are available for download from: http://www.ti.com/lit/zip/spnu613.

Regulatory Information

C.1 EMC Compliance

This is a class A product as defined by standard EN 61326-1:2013. For important information regarding the use of this product in a domestic environment, see the attached “STANDARD TERMS FOR EVALUATION MODULES”.

C.2 Electrostatic Discharge Caution

This EVM can be damaged by ESD. Texas Instruments recommends this EVM be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications. For more information on proper handling, see Electrostatic Discharge (ESD) .

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