

ATA650x Evaluation Board User Guide

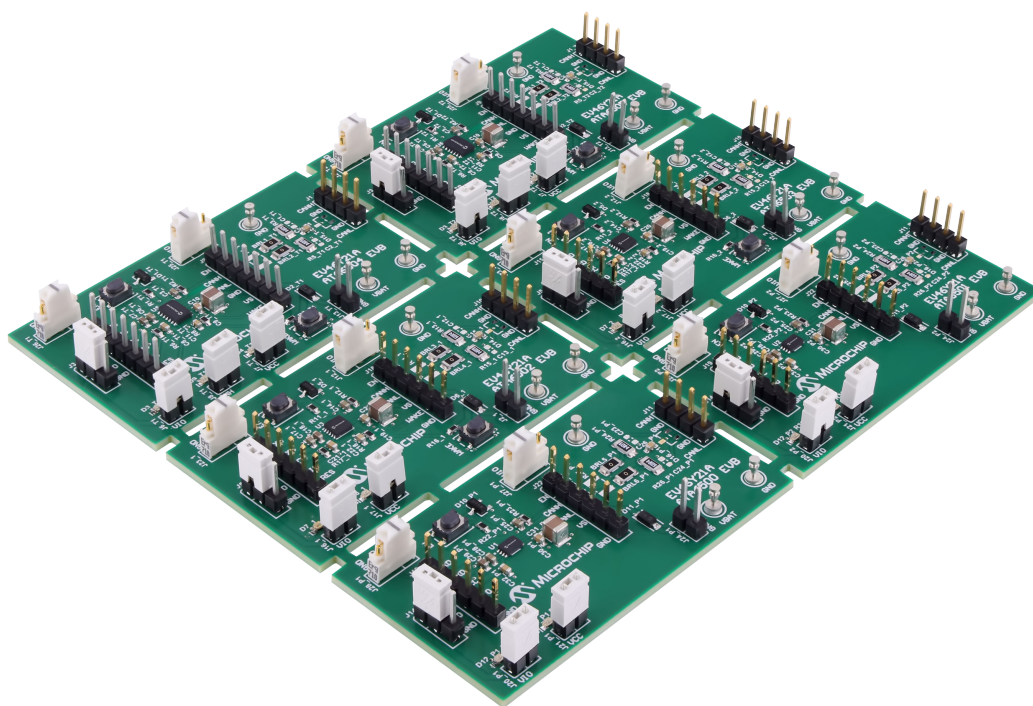
EV46Y21A - ATA6500, ATA6501, ATA6502, ATA6503, ATA6504 and ATA6505 devices



Introduction

The ATA650x Evaluation Board (EV46Y21A) is a hardware platform designed to evaluate the new ATA650x CAN-SBC device family and it enables users to rapidly prototype and test new CAN designs based on the ATA650x ICs. The ATA650x Evaluation Board (EV46Y21A) supports devices ATA6500, ATA6501, ATA6502, ATA6503, ATA6504 and ATA6505.

Figure 1. ATA650x Evaluation Board



The ATA650x is a CAN FD System Basis Chip (SBC) with a fully integrated low-drop voltage regulator (5V/150 mA) and a high-speed CAN FD transceiver that interfaces a Controller Area Network (CAN) protocol controller and a physical two-wire CAN bus. The transceiver is designed for high-speed classical CAN and CAN FD (up to 8 Mbit/s) applications, providing differential transmit and receive capability to a microcontroller with a CAN protocol controller. The combination of a voltage regulator and CAN FD transceiver enables the development of simple but powerful nodes in CAN bus systems. The various operating modes, along with the dedicated fail-safe features make the ATA650X SBC an excellent choice for all types of classical CAN and CAN FD networks. Microchip's SBC is available in very small, space-saving packages with wettable flanks for automated optical inspection capability.

Development Board Features

The EV46Y21A Development Board for the ATA650x ICs supports the following features:

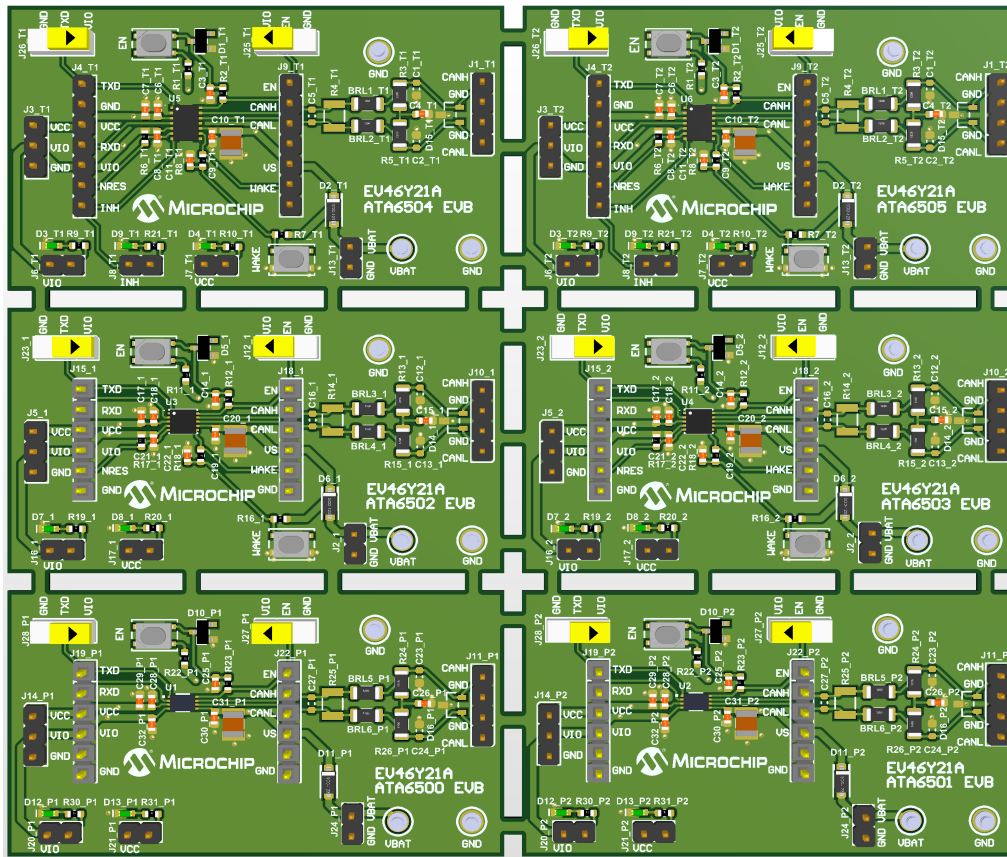
- All Components Necessary to Operate the ATA650x Device are Included.

- All Pins are Easily Accessible.
- Push Buttons are Included for Creating a Local Wake-up after Entering Sleep Mode.
- LED for Indicating an Operation
- A Ground Coulter Clip for an Easy Probe Connection while Measuring with an Oscilloscope
- Jumpers for Mode Control

Kit Contents

- The ATA650x Evaluation Board contains all six variants of the ATA650x device family and can be easily split into six separate stand-alone boards.

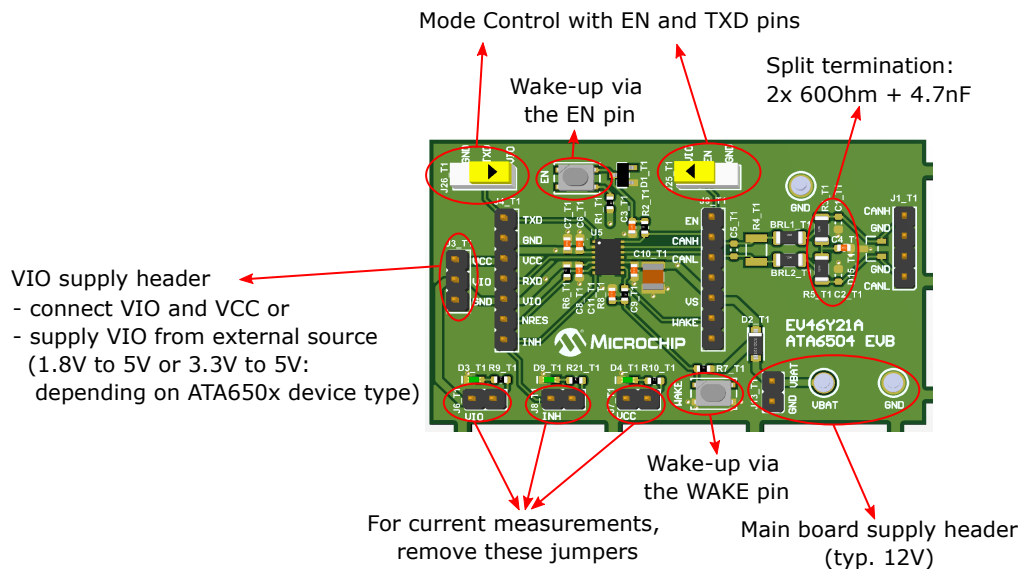
Figure 2. ATA650x Evaluation Board (Top View)



1. Setup and Configuration

The ATA650x Evaluation Board is divided into six parts, where all six variants of ATA650x and all necessary components are soldered, and the board is ready to use.

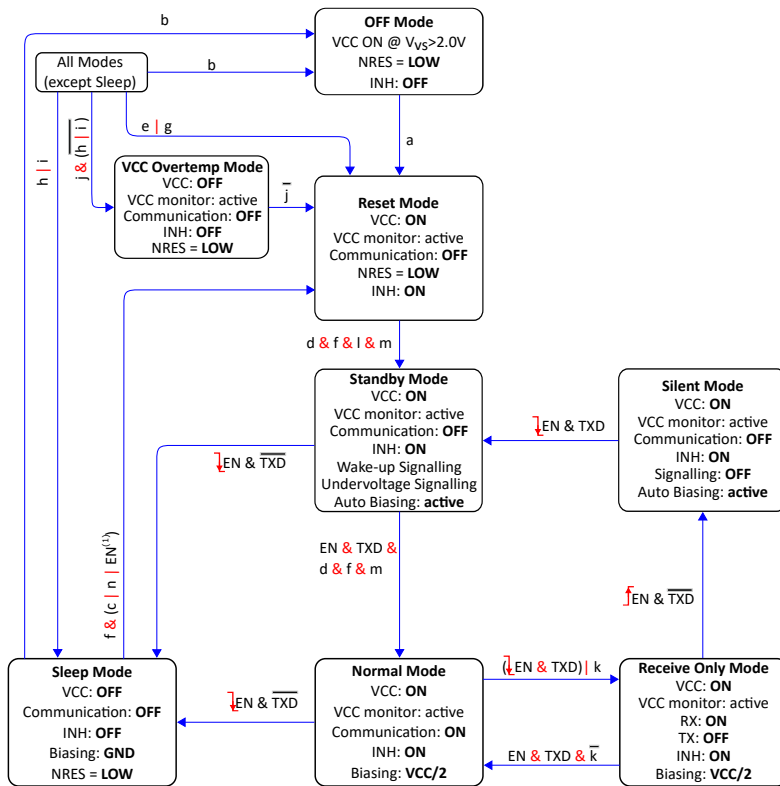
Figure 1-1. ATA650x Evaluation Board Overview



Power up one of the six ATA650x devices:

- Connect power supply (typ.12V) to one of the respective headers: J13-T1, J13_T2, J2_1, J2_2, J24_P1 or J24_P2.
- Interconnect VIO with VCC with jumper J3_T1, J3_T2, J5_1, J5_2, J14_P1 or J14_P2 or supply VIO voltage (1.8V to 5V) at the VIO pin of the respective header. In case the VIO voltage is not present for longer than 400 ms ($t_{VIO_UV_set}$), the device will switch into Sleep mode.
- With the EN and TXD jumpers, the corresponding device can be set into the desired operating mode (see [Figure 1-2](#)). After power-up and EN=0, the device will enter Standby mode. Switching EN=1 while TXD=1, the device will switch into Normal mode and is ready to send or receive data on CANH/CANL.
- With the WAKE or the EN push buttons, the particular device can be woken up from Sleep mode.
- To enter Sleep mode from Normal mode, a falling edge at EN is required, while TXD is set to low during the mode select window. To avoid any influence on the CAN pins when switching into Sleep mode, the EN pin should be set to low first, and after the time $t_{lock_mode_change}$ (5 μ s minimum) where the TXD pin should stay high, the TXD pin can be set to low, but not later than the $t_{d_mode_select}$ (3 μ s maximum) time has elapsed.

Figure 1-2. ATA650x Operating Modes



- a:** $V_{VS} > V_{VS_PWR_ON}$
- b:** $V_{VS} < V_{VS_PWR_OFF}$
- c:** CAN Bus wake-up event
- d:** $V_{VCC} > V_{VCC_th_UV_UP}$
- e:** $V_{VCC} < V_{VCC_th_UV_DOWN}$
- f:** $V_{VS} > V_{VS_th_UV_UP}$
- g:** $V_{VS} < V_{VS_th_UV_DOWN}$
- h:** $V_{VIO} < V_{VIO_UV}$
- i:** Overvoltage VCC
- j:** Overtemperature VCC
- k:** Overtemperature CAN
- l:** t_{RESET} elapsed
- m:** $V_{VIO} > V_{VIO_UV}$
- n:** Local wake-up event (WAKE pin)

- f** : Rising Edge Trigger
- j** : Falling Edge Trigger

- A** : Overbar Logical NOT
- &** : Logical AND
- |** : Logical OR

Note: (1) If the mode change into Sleep mode was due to VCC Overvoltage, a rising edge on the EN pin (and not only logic level) is necessary in order to wake up the device.

2. Board Design

This chapter contains the following schematics and layouts for the ATA650x Evaluation Board:

- [Board - Main Schematic](#)
- [ATA6500 Board - Schematic](#)
- [ATA6501 Board - Schematic](#)
- [ATA6502 Board - Schematic](#)
- [ATA6503 Board - Schematic](#)
- [ATA6504 Board - Schematic](#)
- [ATA6505 Board - Schematic](#)
- [Top Silk](#)
- [Top Copper and Silk](#)
- [Top Copper](#)
- [Bottom Copper](#)
- [Bottom Copper and Silk](#)
- [Bottom Silk](#)

2.1. Schematic(s)

Figure 2-1. Board - Main Schematic

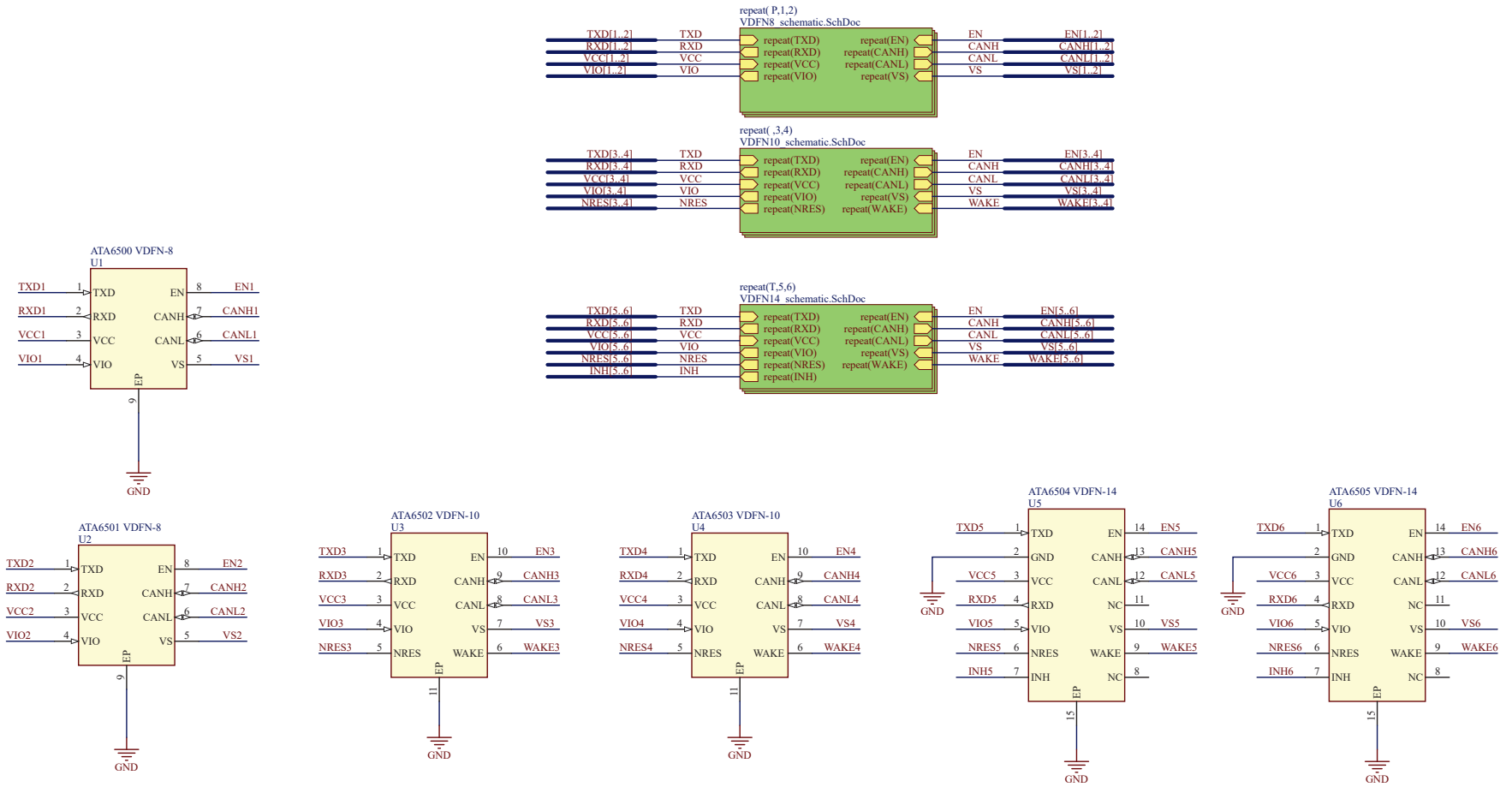


Figure 2-2. ATA6500 Board - Schematic

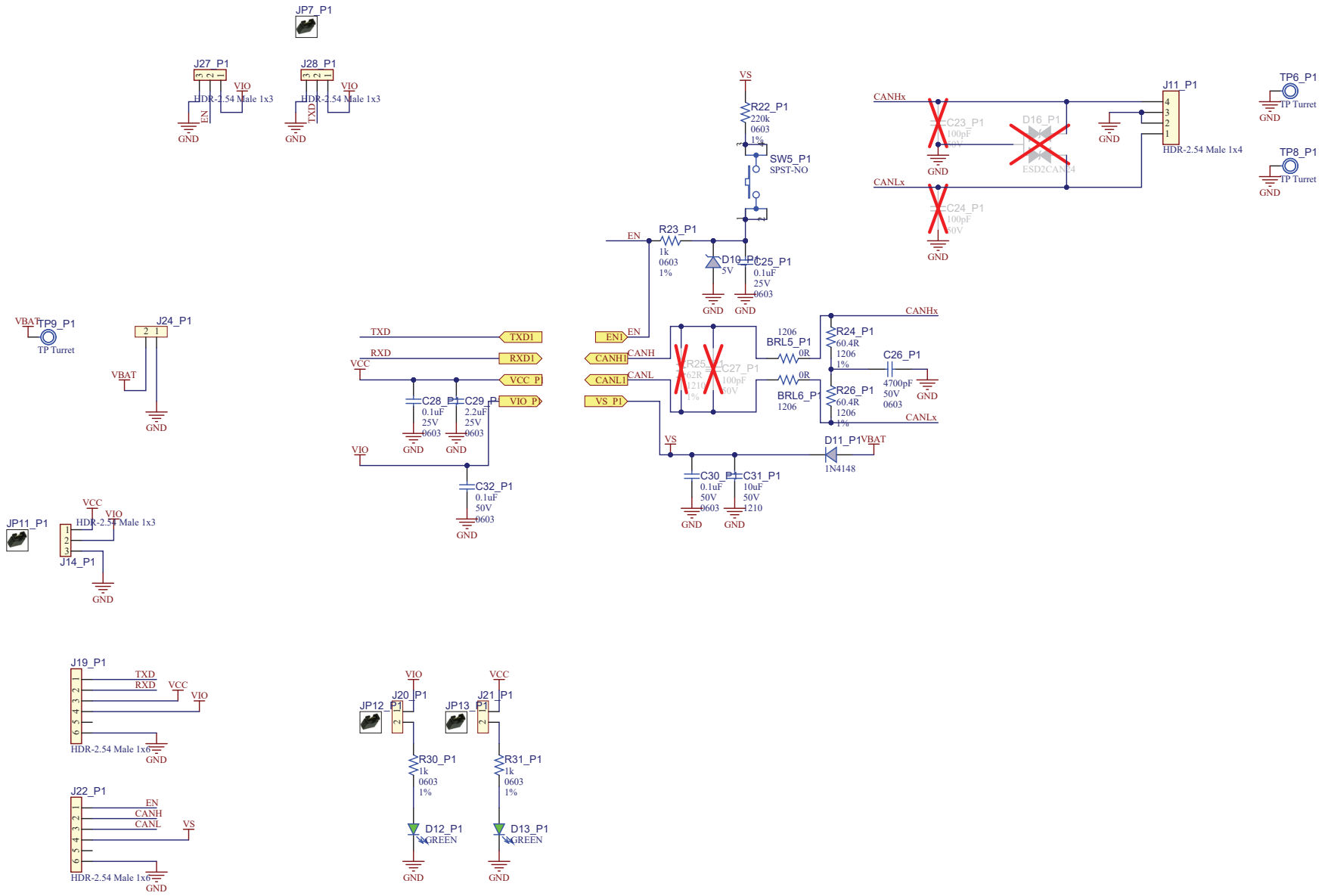


Figure 2-3. ATA6501 Board - Schematic

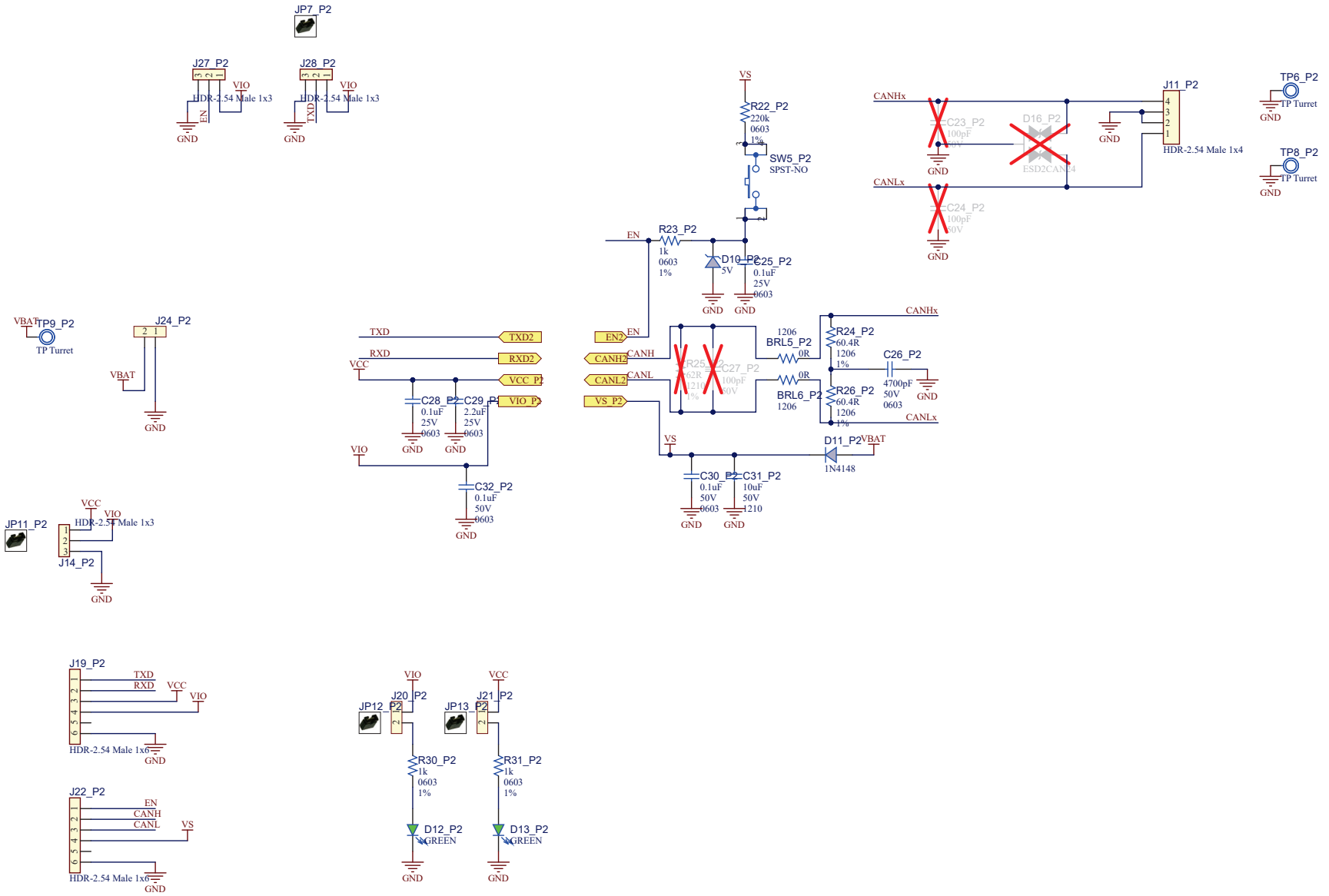


Figure 2-4. ATA6502 Board - Schematic

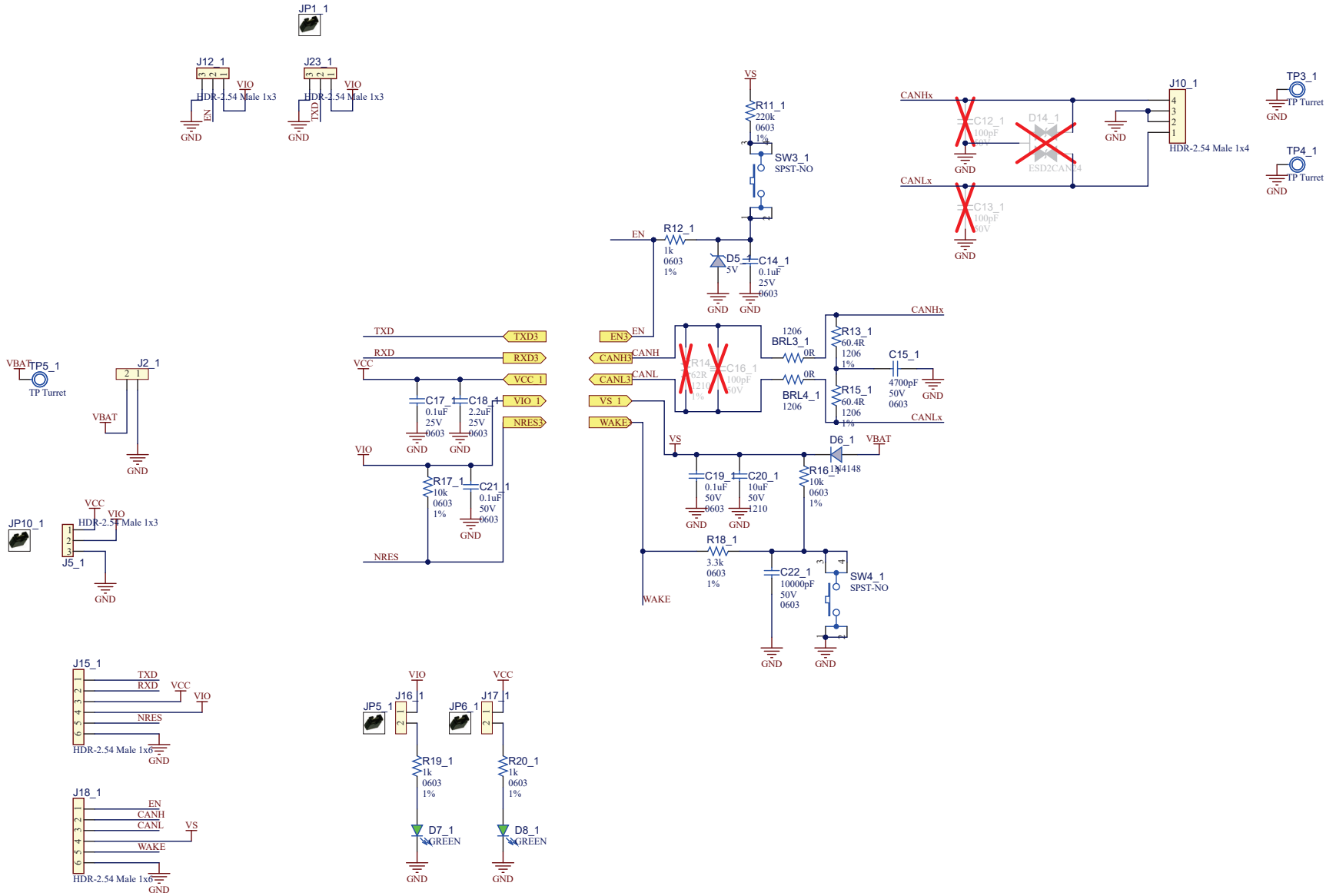


Figure 2-5. ATA6503 Board - Schematic

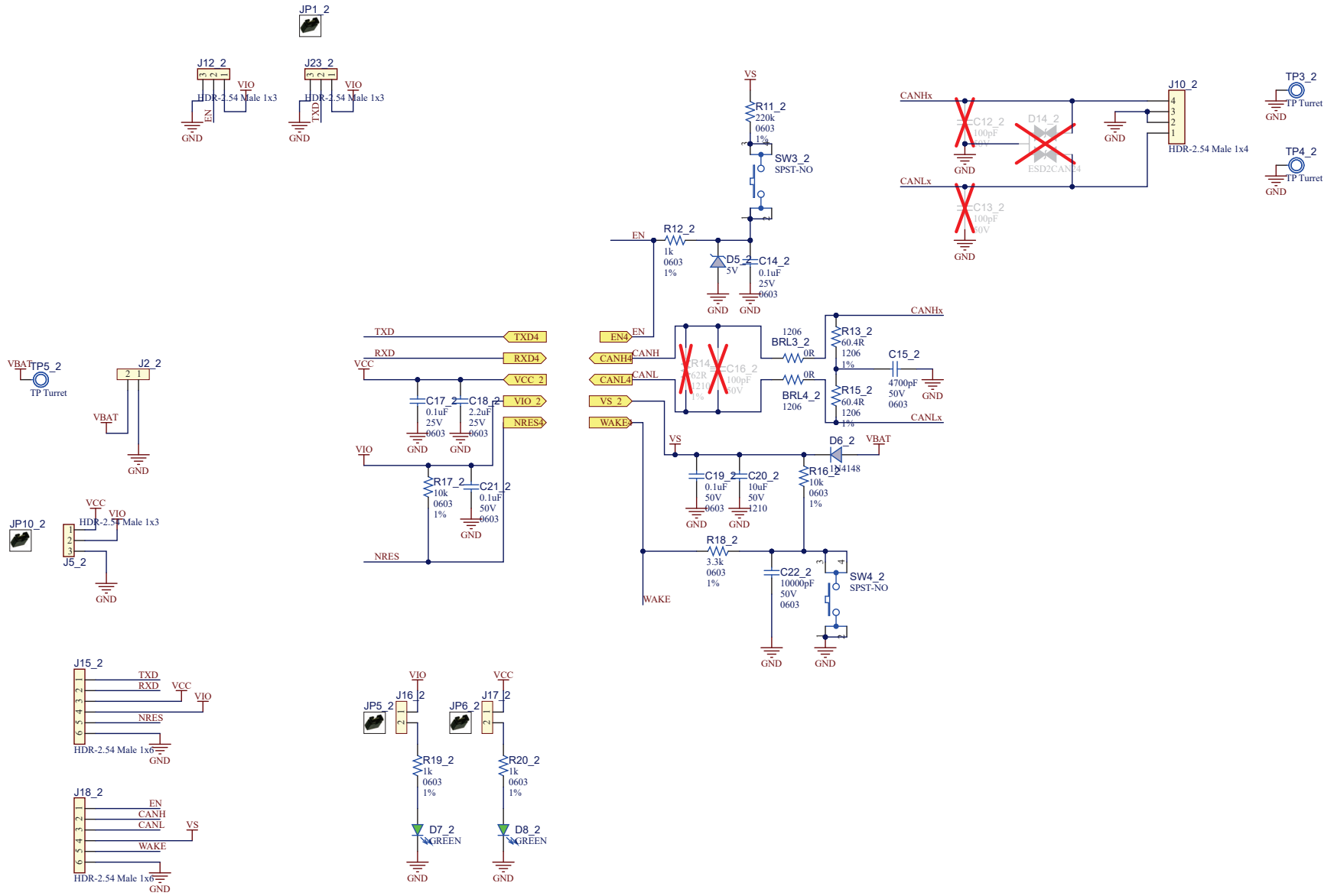


Figure 2-6. ATA6504 Board - Schematic

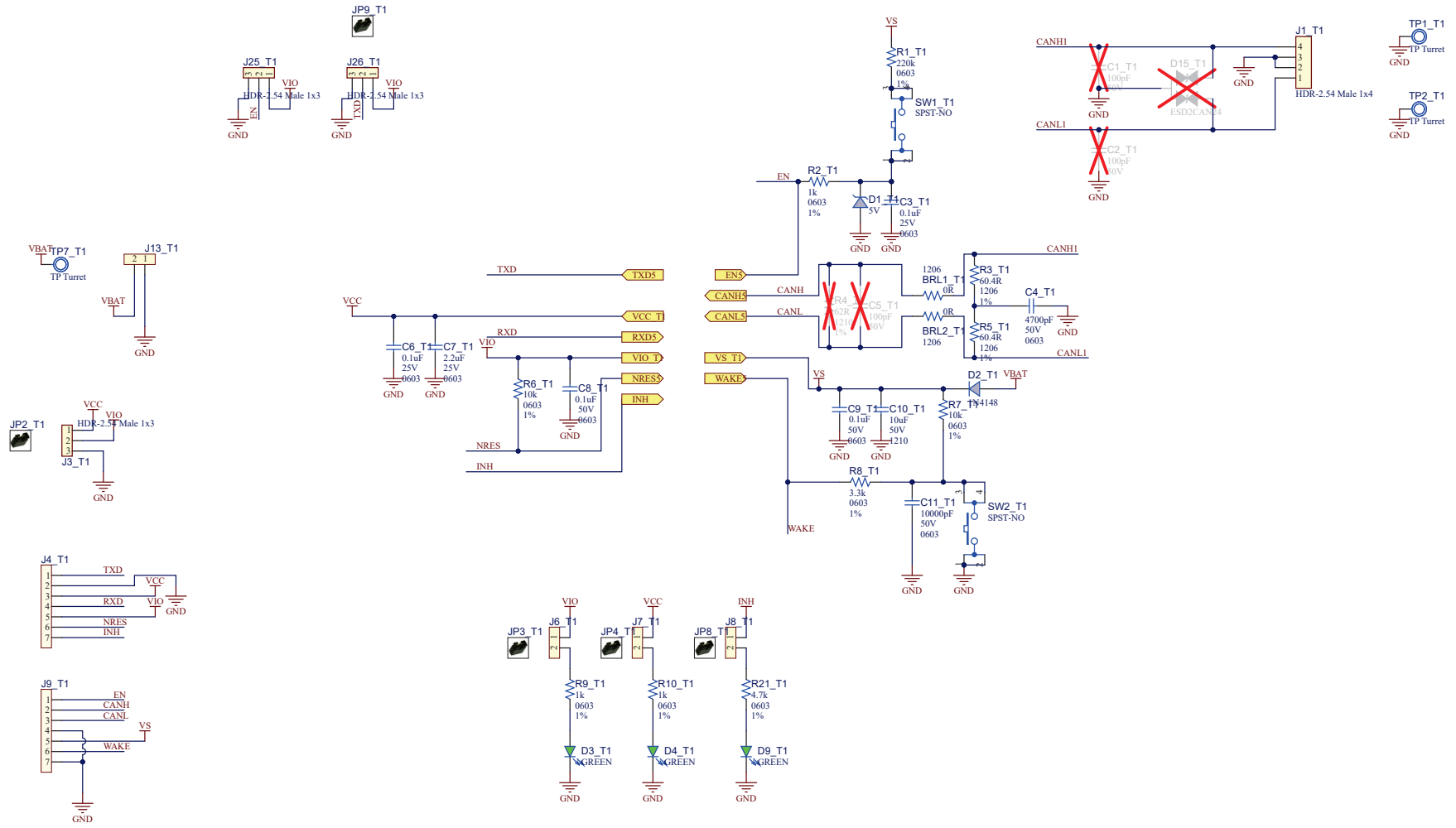
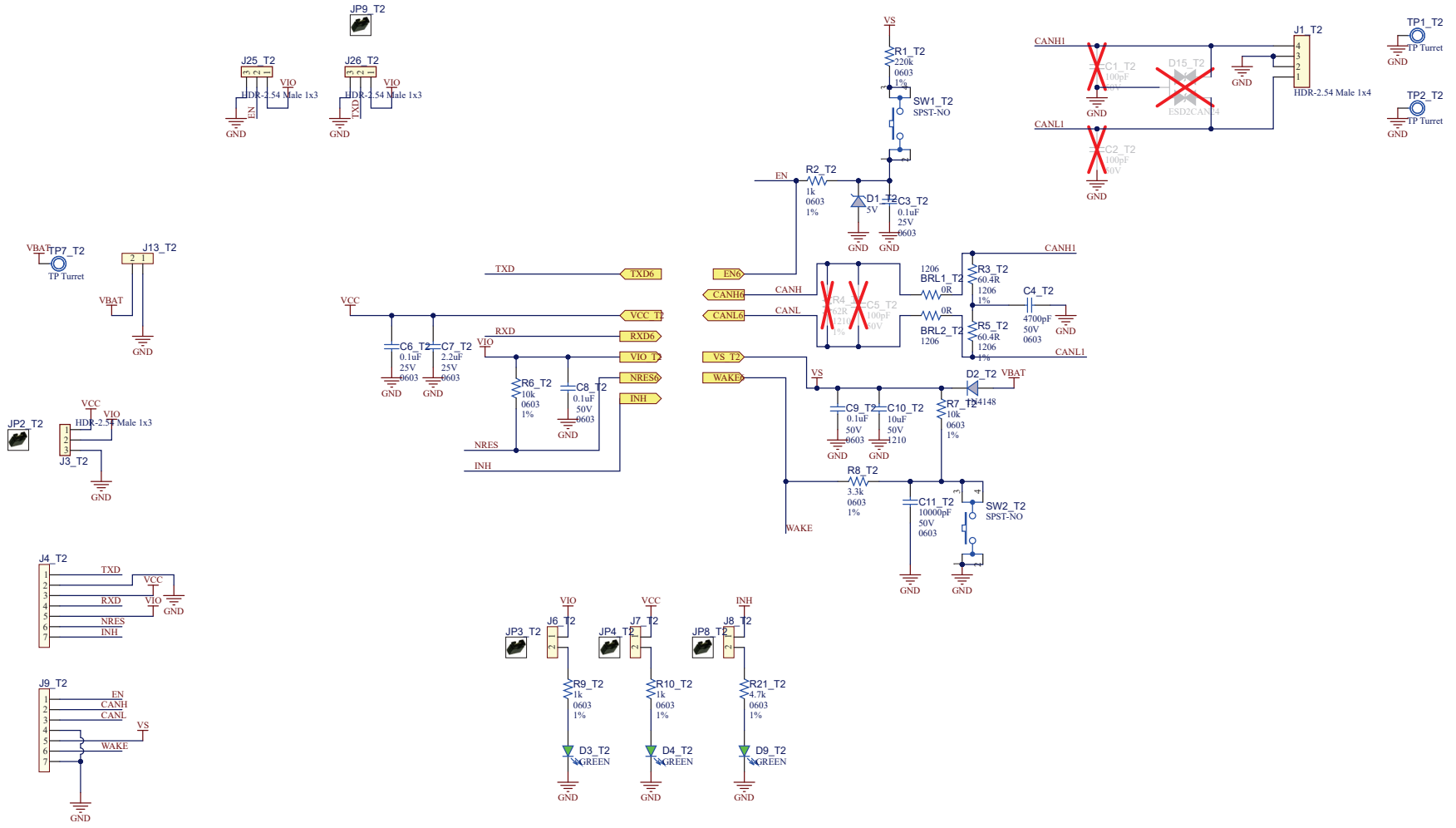


Figure 2-7. ATA6505 Board - Schematic



2.2. Layout(s)

Figure 2-8. Top Silk

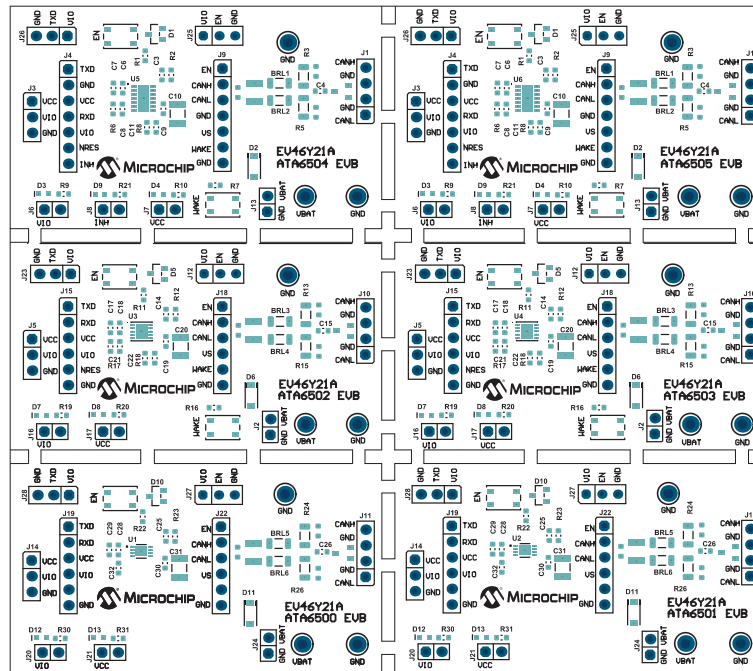


Figure 2-9. Top Copper and Silk

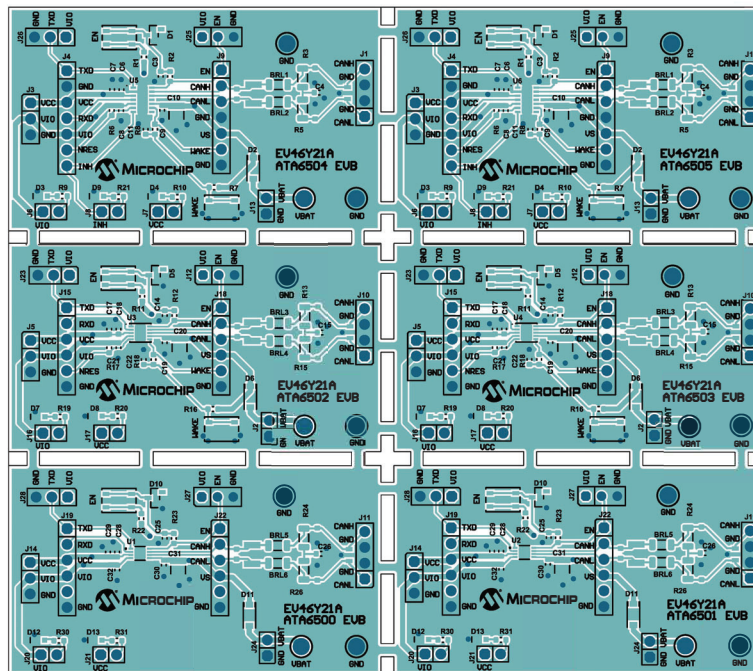


Figure 2-10. Top Copper

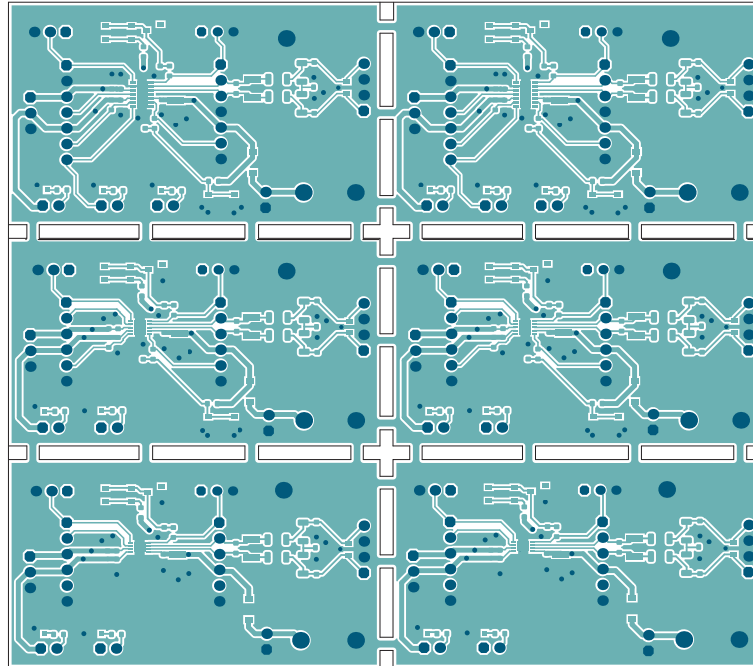


Figure 2-11. Bottom Copper

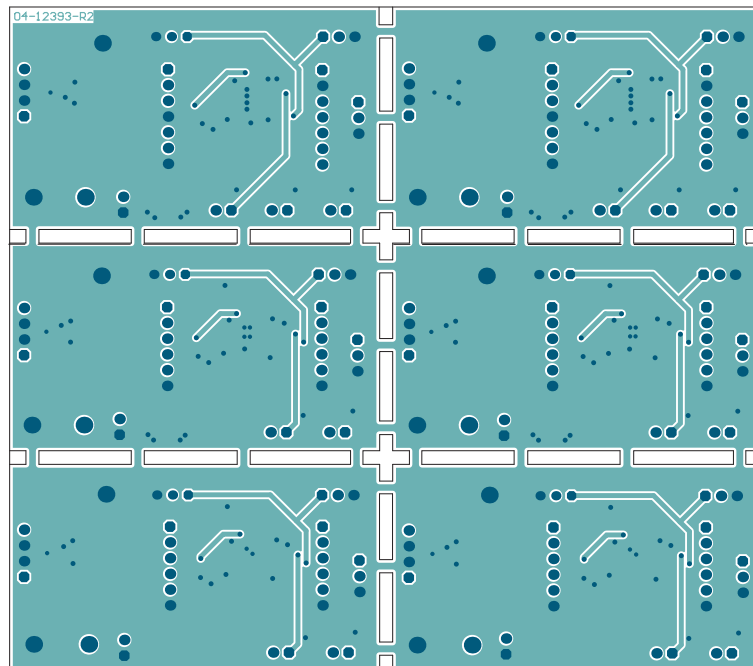


Figure 2-12. Bottom Copper and Silk

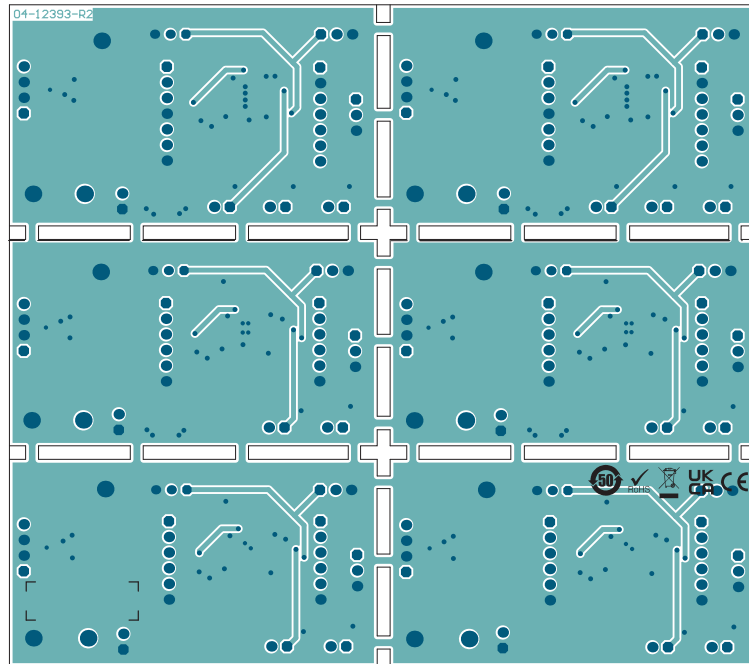
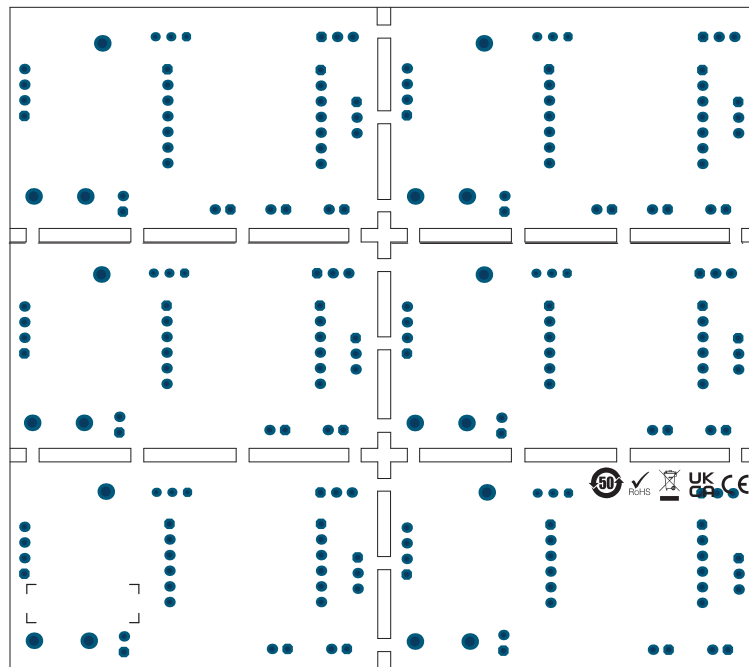


Figure 2-13. Bottom Silk



2.3. Bill of Materials (BOM)

Table 2-1. Bill of Materials (BOM)

Qty	Reference	Description	Manufacturer	Part Number
12	BRL1_T1, BRL1_T2, BRL2_T1, BRL2_T2, BRL3_1, BRL3_2, BRL4_1, BRL4_2, BRL5_P1, BRL5_P2, BRL6_P1, BRL6_P2	Resistor, TKF, 0R, 1/4W, SMD, 1206 AEC-Q200	Stackpole Electronics, Inc.	RMCF1206ZT0R00
12	C3_T1, C3_T2, C6_T1, C6_T2, C14_1, C14_2, C17_1, C17_2, C25_P1, C25_P2, C28_P1, C28_P2	Capacitor Ceramic, 0.1 μ F, 25V, 20%, Y5V, SMD, 0603	Samsung Electro-Mechanics America, Inc.	CL10F104ZA8NNNC
6	C4_T1, C4_T2, C15_1, C15_2, C26_P1, C26_P2	Capacitor, Ceramic, 4.7 nF, 50V, 10%, X7R, SMD, 0603 AEC-Q200	AVX Corporation *	06035C472K4T2A
6	C7_T1, C7_T2, C18_1, C18_2, C29_P1, C29_P2	Capacitor, Ceramic, 2.2 μ F, 25V, 10%, X5R, SMD, 0603	Murata Manufacturing Co., Ltd.	GRM188R61E225KA12D
12	C8_T1, C8_T2, C9_T1, C9_T2, C19_1, C19_2, C21_1, C21_2, C30_P1, C30_P2, C32_P1, C32_P2	Capacitor, Ceramic, 100 nF, 50V, 10%, X7R, SMD, 0603, AEC-Q200	AVX Corporation	06035C104K4T2A
6	C10_T1, C10_T2, C20_1, C20_2, C31_P1, C31_P2	Capacitor, Ceramic, 10 μ F, 50V, 20%, X7R, SMD, 1210	Kyocera AVX *	CM32X7R106M50AT
4	C11_T1, C11_T2, C22_1, C22_2	Capacitor, Ceramic, 10 nF, 50V, 10%, X7R, SMD, 0603, AEC-Q200	AVX Corporation	06035C103K4T2A
6	D1_T1, D1_T2, D5_1, D5_2, D10_P1, D10_P2	Diode, Zener, 5V, 250 mW, SOT-23-3	NXP Semiconductors	PLVA650A,215
6	D2_T1, D2_T2, D6_1, D6_2, D11_P1, D11_P2	Diode, Rectifier, 1.25V, 150 mA, 100V, SOD-123	Diodes Incorporated*	1N4148W-7-F
14	D3_T1, D3_T2, D4_T1, D4_T2, D7_1, D7_2, D8_1, D8_2, D9_T1, D9_T2, D12_P1, D12_P2, D13_P1, D13_P2	Diode, LED, Green, 2.1V, 30 mA, 6 mcd, Clear, SMD, 0603	Lite-On®, Inc.	LTST-C190GKT
6	J1_T1, J1_T2, J10_1, J10_2, J11_P1, J11_P2	Connector, HDR-2.54, Male, 1x4, Gold, 5.84 MH, Through Hole, Vertical	Samtec, Inc.	TSW-104-07-G-S
20	J2_1, J2_2, J6_T1, J6_T2, J7_T1, J7_T2, J8_T1, J8_T2, J13_T1, J13_T2, J16_1, J16_2, J17_1, J17_2, J20_P1, J20_P2, J21_P1, J21_P2, J24_P1, J24_P2	Connector, HDR-2.54, Male, 1x2, Tin, 6.75 MH, Through Hole, Vertical	Molex, LLC	0901200122
12	J3_T1, J3_T2, J5_1, J5_2, J14_P1, J14_P2, J23_1, J23_2, J26_T1, J26_T2, J28_P1, J28_P2	Connector, HDR-2.54, Male, 1x3, Tin, 5.84 MH, Through Hole, Vertical	Samtec, Inc.	TSW-103-07-T-S
4	J4_T1, J4_T2, J9_T1, J9_T2	Connector, HDR-2.54, Male, 1x7, Tin, 5.84 MH, Through Hole, Vertical	Samtec, Inc.	TSW-107-07-T-S
6	J12_1, J12_2, J25_T1, J25_T2, J27_P1, J27_P2	Connector, HDR-2.54, Male, 1x3, Gold, 8.4 MH, Through Hole, Vertical Slide	ERG Components	JSC4-1-G0
8	J15_1, J15_2, J18_1, J18_2, J19_P1, J19_P2, J22_P1, J22_P2	Connector, HDR-2.54, Male, 1x6, Gold, 5.84 MH, Through Hole, Vertical	FCI Basics - Amphenol	68001-106HLF
6	R1_T1, R1_T2, R11_1, R11_2, R22_P1, R22_P2	Resistor, Thick Film, 220k, 1%, 1/10W, SMD, 0603	Yageo Corporation	9C06031A2203FKHFT

Table 2-1. Bill of Materials (BOM) (continued)

Qty	Reference	Description	Manufacturer	Part Number
18	R2_T1, R2_T2, R9_T1, R9_T2, R10_T1, R10_T2, R12_1, R12_2, R19_1, R19_2, R20_1, R20_2, R23_P1, R23_P2, R30_P1, R30_P2, R31_P1, R31_P2	Resistor, Thick Film, 1k, 1%, 1/10W, SMD, 0603, AEC-Q200	Panasonic® - ECG	ERJ-3EKF1001V
12	R3_T1, R3_T2, R5_T1, R5_T2, R13_1, R13_2, R15_1, R15_2, R24_P1, R24_P2, R26_P1, R26_P2	Resistor, Thick Film, 60.4R, 1%, 1/4W, SMD, 1206, AEC-Q200	Panasonic - ECG	ERJ-8ENF60R4V
8	R6_T1, R6_T2, R7_T1, R7_T2, R16_1, R16_2, R17_1, R17_2	Resistor, Thick Film, 10k, 1%, 1/10W, SMD, 0603	Panasonic - ECG	ERJ-3EKF1002V
4	R8_T1, R8_T2, R18_1, R18_2	Resistor, Thick Film, 3.3k, 1%, 1/10W, SMD, 0603	Vishay Intertechnology, Inc.*	CRCW06033K30FKEA
2	R21_T1, R21_T2	Resistor, Thick Film, 4.7k, 1%, 1/10W, SMD, 0603	Digi-Key Electronics *	311-4.70KHRTR-ND
10	SW1_T1, SW1_T2, SW2_T1, SW2_T2, SW3_1, SW3_2, SW4_1, SW4_2, SW5_P1, SW5_P2	Switch, Tactile, SPST, 16V, 50 mA, SMD	C&K Components *	PTS810 SJM 250 SMTR LFS
18	TP1_T1, TP1_T2, TP2_T1, TP2_T2, TP3_1, TP3_2, TP4_1, TP4_2, TP5_1, TP5_2, TP6_P1, TP6_P2, TP7_T1, TP7_T2, TP8_P1, TP8_P2, TP9_P1, TP9_P2	Connector, Test Point, Tin, Brass Through Hole, D1.6H4	Keystone Electronics Corp.*	1593-3
1	PCB1	Printed Circuit Board	-	04-12393-R2
1	PCBA1	PCB Assembly	-	02-01332-R2

Table 2-2. Bill of Materials (BOM) – Microchip Parts

Qty	Reference	Description	Manufacturer	Part Number
1	U1	Interface CAN, 1.8V-5V, VDFN-8, AEC-Q100	Microchip Technology Inc.	ATA6500T-4CWVAO
1	U2	Interface CAN, 3.3V-5V, VDFN-8, AEC-Q100	Microchip Technology Inc.	ATA6501T-4CWVAO
1	U3	Interface CAN, 1.8V-5V, VDFN-10, AEC-Q100	Microchip Technology Inc.	ATA6502T-4BWVAO
1	U4	Interface CAN, 3.3V-5V, VDFN-10, AEC-Q100	Microchip Technology Inc.	ATA6503T-4BWVAO
1	U5	Interface CAN, 1.8V-5V, VDFN-14, AEC-Q100	Microchip Technology Inc.	ATA6504T-QBBVAO
1	U6	Interface CAN, 3.3V-5V, VDFN-14, AEC-Q100	Microchip Technology Inc.	ATA6505T-QBBVAO

Table 2-3. Bill of Materials (BOM) – Mechanical Parts

Qty	Reference	Description	Manufacturer	Part Number
26	JP1_1, JP1_2, JP2_T1, JP2_T2, JP3_T1, JP3_T2, JP4_T1, JP4_T2, JP5_1, JP5_2, JP6_1, JP6_2, JP7_P1, JP7_P2, JP8_T1, JP8_T2, JP9_T1, JP9_T2, JP10_1, JP10_2, JP11_P1, JP11_P2, JP12_P1, JP12_P2, JP13_P1, JP13_P2	Jumper, Headers & Wires, 2.54 mm, 1x2	FCI Basics - Amphenol	63429-202LF
1	LABEL1	Label, PCB 18 x 6 mm, Datamatrix, Assy#/Rev/Serial/Date	ACT Logimark AS*	505462

Table 2-4. Bill of Materials (BOM) – Do Not Populate Parts

Qty	Reference	Description	Manufacturer	Part Number
0	C1_T1, C1_T2, C2_T1, C2_T2, C5_T1, C5_T2, C12_1, C12_2, C13_1, C13_2, C16_1, C16_2, C23_P1, C23_P2, C24_P1, C24_P2, C27_P1, C27_P2	Capacitor, Ceramic, 100 pF, 50V, 5%, NP0, SMD, 0603	Cal-Chip Electronics Inc.	GMC10CG101J50NT
0	D14_1, D14_2, D15_T1, D15_T2, D16_P1, D16_P2	Diode, TVS, 24V, SOT23-3, AEC-Q101	Texas Instruments	ESD2CAN24DBZRQ1

Table 2-4. Bill of Materials (BOM) – Do Not Populate Parts (continued)

Qty	Reference	Description	Manufacturer	Part Number
0	R4_T1, R4_T2, R14_1, R14_2, R25_P1, R25_P2	Resistor, Thick Film, 62R, 1%, 1/2W, SMD, 1210, AEC-Q200	Panasonic - ECG	ERJ-14NF62R0U

3. References

Table 3-1. Recommended Reading

Source	Document Title	Literature Number	Available
Microchip Technology, Inc.	ATA650x Datasheet	DS20006909	www.microchip.com/en-us/product/ATA6500

4. Revision History

Doc. Rev.	Date	Comments
A	April 2025	Initial release of this document.

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