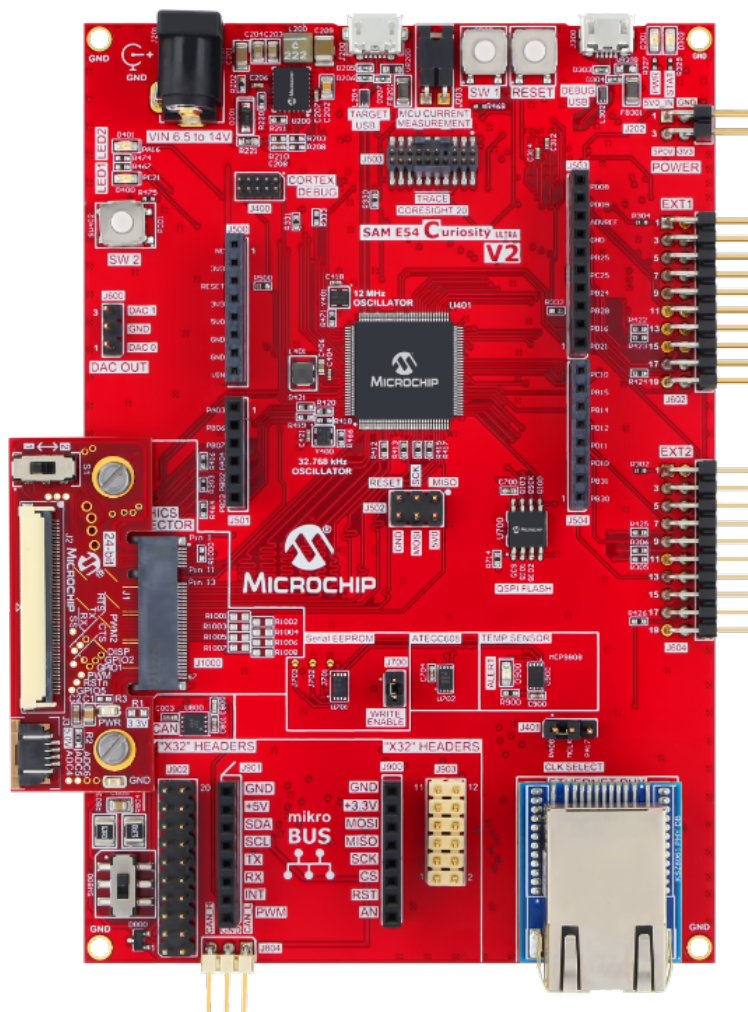


Introduction



The SAM E54 Curiosity Ultra Development Board (EV66Z56A) includes an integrated programmer and debugger, hence additional hardware is not required to get started. Users can add functionality through MikroElektronika mikroBUS™ Click™ adapter boards, add Ethernet connectivity with the Microchip PHY Daughter Board, add Wi-Fi™ connectivity capability using the Microchip expansions boards, and add audio input and output capability with Microchip audio daughter boards.

With or without expansion boards, the SAM E54 Curiosity Ultra Development Board provides the freedom to develop for a variety of applications, including Bluetooth® Audio, CAN, Graphics User Interface (GUI), Internet of Things (IoT), robotics development, and proof-of-concept (PoC) designs.

Features

The following are key features of the SAM E54 Curiosity Ultra development board:

- ATSAME54P20A, 120 MHz, 1 MB Flash, 256 KB RAM
- On-Board Debugger (EDBG)
 - Real time Programming and Debugging
 - Virtual COM port (VCOM)
 - Data Gateway Interface (DGI)
- One mikroBUS interfaces
- One X32 audio interfaces supporting Bluetooth and audio
- Ethernet interface
- Graphics interface
- Xplained Pro extension compatible interface
- CAN interface
- User buttons
- User LEDs
- 8-MB QSPI memory
- Arduino® UNO R3 compatible interface

Kit Contents

The development board kit contains one SAM E54 Curiosity Ultra development board (EV66Z56A).

Note: If you are missing any part of the kit, contact a local Microchip sales office for assistance. A list of Microchip offices for sales and service is provided on the last page of this document.

Table of Contents

Introduction.....	1
Features.....	2
Kit Contents.....	2
1. SAM E54 Curiosity Ultra Development Board Functionality and Features.....	4
1.1. SAM E54 Curiosity Ultra Development Board Features.....	4
1.2. System Block Diagram.....	6
1.3. Power Block Diagram.....	7
1.4. EDBG.....	8
1.5. Audio Clock Selection.....	10
1.6. mikroBUS.....	11
1.7. Xplained Pro Standard Extension Header.....	12
1.8. Graphics Connectors or GFX Card Interface.....	13
1.9. Ethernet.....	14
1.10. AT24MAC402 Serial EEPROM.....	16
1.11. On-Board External Temperature Sensor	16
1.12. Hardware Features.....	16
2. Hardware.....	17
2.1. Schematics.....	17
2.2. Bill of Materials.....	28
3. Revision History.....	32
3.1. Revision B - February 2025.....	32
3.2. Revision A - August 2019.....	32
Microchip Information.....	33
Trademarks.....	33
Legal Notice.....	33
Microchip Devices Code Protection Feature.....	33

1. SAM E54 Curiosity Ultra Development Board Functionality and Features

The SAM E54 Curiosity Ultra development board features and functionalities are given in the following sections.

1.1 SAM E54 Curiosity Ultra Development Board Features

Figure 1-1. SAM E54 Curiosity Ultra Development Board Layout (Top View)

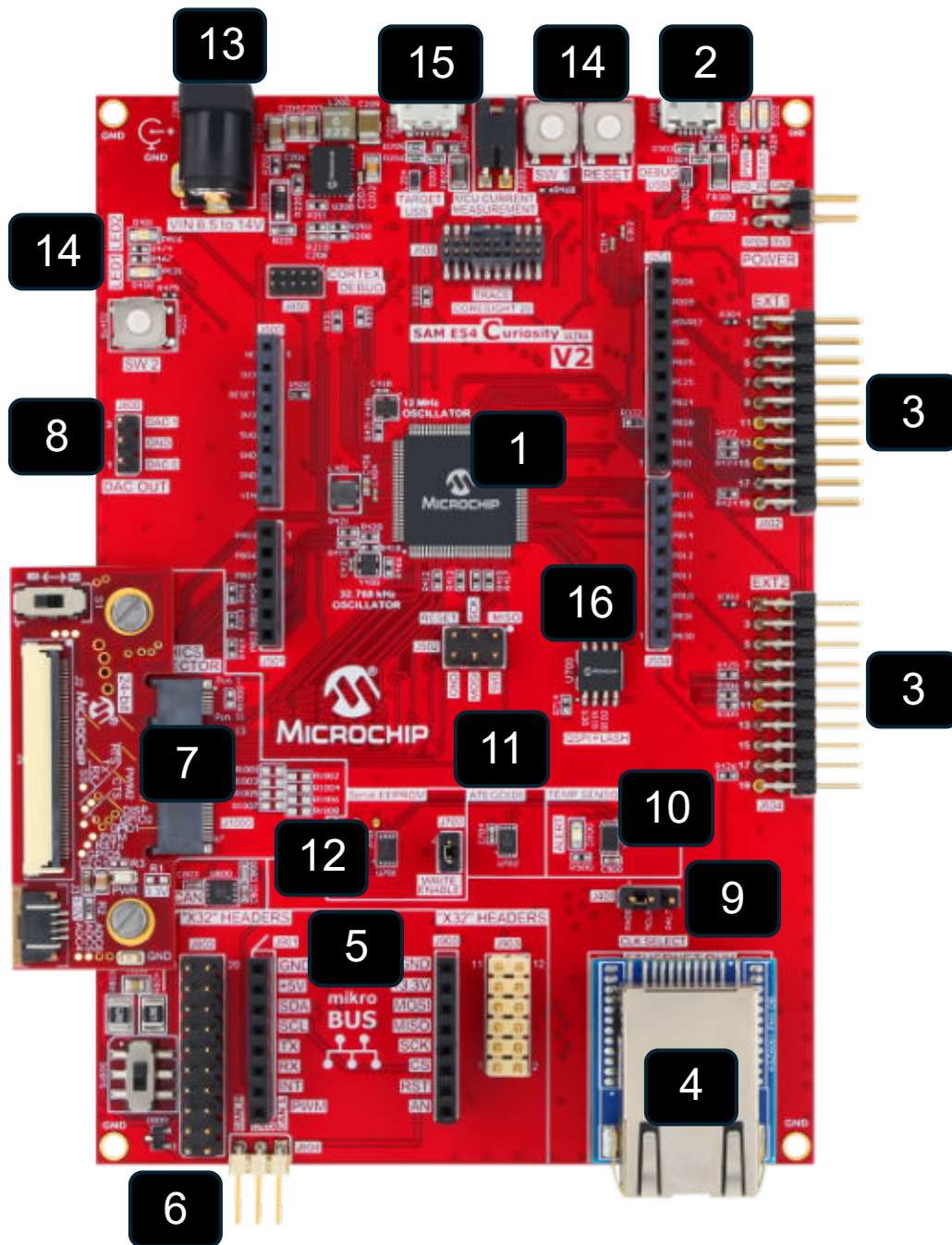


Table 1-1. SAM E54 Curiosity Ultra Development Board Feature Descriptions

Number	Description of item
1	ATSAME54P20A
2	USB debugger interface
3	Xplained Pro expansion compatible interface
4	Ethernet interface (RMII, SPI, GPIO).
5	X32 audio interface. 2 per board. Bluetooth® and audio codecs sold separately
6	CAN interface
7	Graphics interface
8	DAC output
9	Audio reference clock select
10	I ² C temp sensor (MCP9808)
11	ATECC508
12	I ² C Serial EEPROM with MAC address
13	2.1 mm barrel jack power input
14	Programmable user buttons and LEDs
15	USB to ATSAME54P20A
16	Quad SPI memory 256 Mb (8 MB)

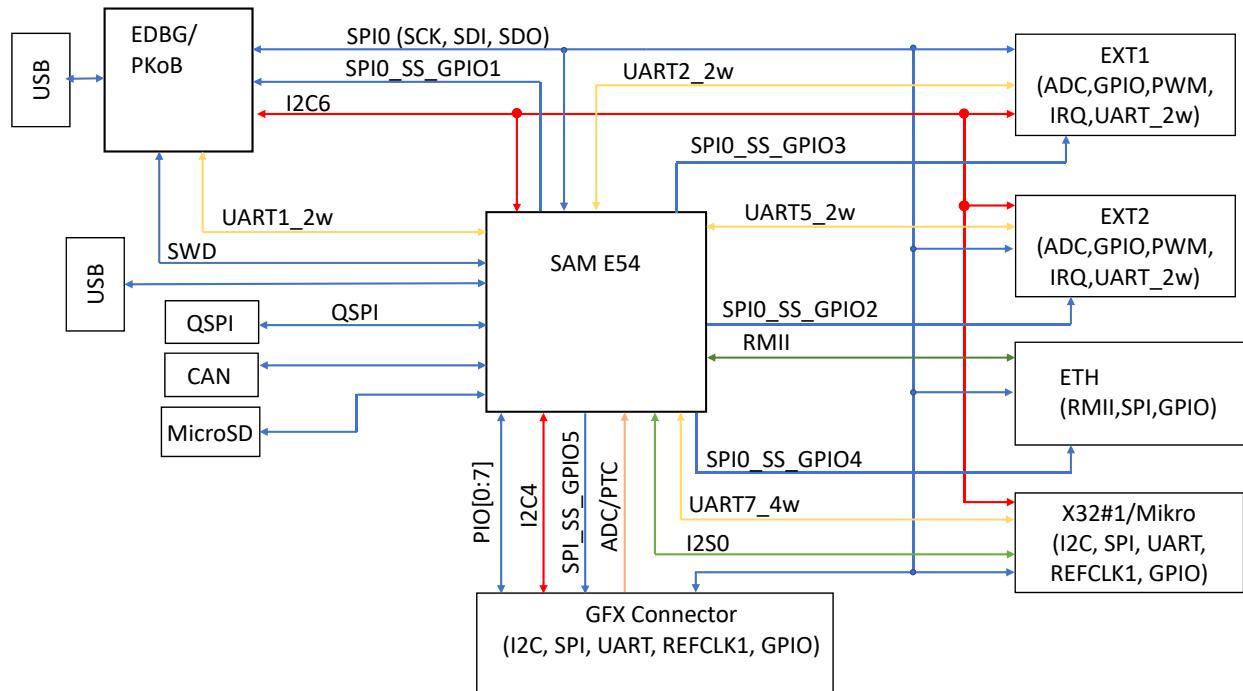
Table 1-2. SAM E54 Microchip Total System Solutions (TSS)

TSS Component	Qty (per board)	Function
MIC24052YJL	1	BUCK REGULATOR 12V 6A
MIC5528-3.3YMT	2	LDO 3.3V 0.5A
MIC2005A-2YM5	1	500 mA PWR SWITCH
AT32UC3A4256HHB	1	EDBG MCU
MCP6001UT	1	Single Op Amplifier, low power.
ATSAME54P20A	1	Target MCU
SST26VF064BA	1	Serial Quad I/O (SQI) Flash Memory
AT24MAC402	1	EEPROM
ATECC608B	1	TrustFLEX IC
ATA6561	1	CAN Transceiver
MCP9808T	1	Temperature Sensor
DSC6011J12B-032K768	1	32.768 kHz oscillator
DSC6003J12B-012.0000	1	12 MHz oscillator
DSC1001CI2-050.0000	1	50 MHz oscillator
VN2110K1	2	N-CH MOSFET

1.2 System Block Diagram

The following figure illustrates the system block diagram, which indicates the data bus routing.

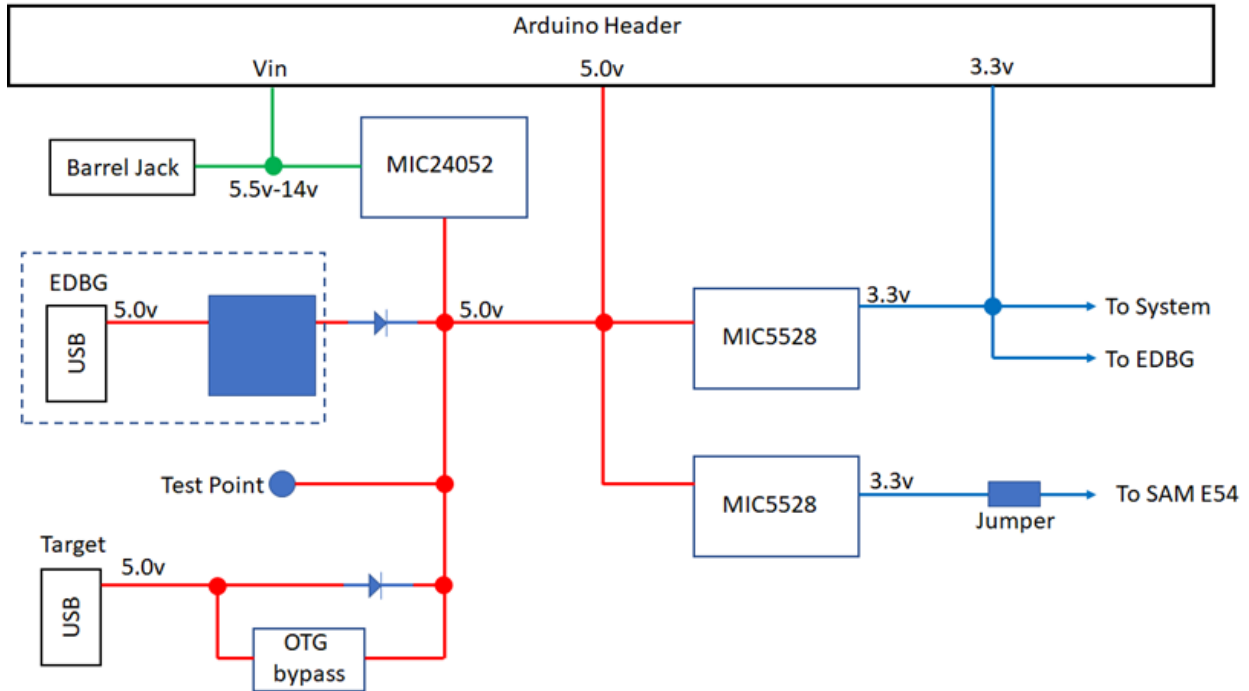
Figure 1-2. System Block Diagram



1.3 Power Block Diagram

The following diagram shows the power system on the SAM E54 Curiosity Ultra development board. The development board has many power sub systems that allow it to accept up to 16V. The barrel jack is a 2.1 mm center positive connector. The power in can also be connected through the Arduino header (Vin), and it supplies power before the reverse voltage protection.

Figure 1-3. Power Block Diagram



1.4 EDBG

The SAM E54 Curiosity Ultra development board implements several Curiosity Pro standards, such as extension headers and connectors. Curiosity Pro is an evaluation platform that provides a full Microchip microcontroller experience. The platform consists of a series of Microcontroller (MCU) boards and extension boards that are integrated with the Microchip MPLAB® X IDE that supports data streaming. The Curiosity Pro MCU boards support a wide range of Curiosity Pro extension boards, such as audio DACs and codecs, Ethernet PHYs, graphics cards, and mikroBUS that are connected through a set of standardized headers and connectors. Each extension board has an identification (ID) chip to uniquely identify which boards are connected to a Xplained Pro MCU board. This information is given in the relevant user guides, application notes, data sheets, and code examples through the MPLAB X IDE.

The development board contains a Microchip Embedded Debugger (EDBG) for on-board debugging. The EDBG is a complex USB device, which is based on the following interfaces:

- Debugger
- Virtual COM Port
- Data Gateway Interface (DGI)

Together with the Microchip MPLAB X IDE, the EDBG debugger interface can program and debug the ATSAME54P20A. On the development board, the SWD interface is connected between the EDBG and the ATSAME54P20A.

The Virtual COM Port is connected to a UART on the ATSAME54P20A and provides an easy way to communicate with the target application through the terminal software. It offers variable baud rate, parity, and the Stop bit settings. The settings on the ATSAME54P20A must match with the settings given in the terminal software.

Note: If not configured automatically, the Data Terminal Ready (DTR) setting must be set in the terminal software.

The DGI consists of several physical interfaces for communication with the host computer. Communication over the interfaces is bidirectional. It can be used to send events and values from the ATSAME54P20A, or as a generic printf-style data channel. Traffic over the interfaces can be timestamped on the EDBG for accurate tracing of events. Timestamping imposes an overhead that reduces maximal throughput. The Data Visualizer is used to send and receive data through DGI.

The EDBG controls two LEDs on the development board: a power LED and a status LED. The table below provides how the LEDs are controlled in different operation modes.

Table 1-3. EDBG LED Control

Operation Mode	Power LED	Status LED
Normal operation	The power LED is lit when power is applied to the board.	Activity indicator, LED flashes when any communication happens to the EDBG.
Bootloader mode (Idle mode)	The power LED and the status LED blinks simultaneously.	The power LED and the status LED blinks simultaneously.
Bootloader mode (firmware upgrade)	The power LED and the status LED blinks in an alternating pattern.	The power LED and the status LED blinks in an alternating pattern.

For additional information on EDBG, refer to the [EDBG User Guide](#).

Hardware Identification System

All Curiosity Pro-compatible extension boards have an Microchip ATSHA204 CryptoAuthentication™ chip mounted. This chip contains information that identifies the extension with its name and data. When an Xplained Pro extension is connected to a Curiosity Pro MCU board, the information is read and sent to the MPLAB X IDE. The Microchip kits extension, installed with MPLAB X IDE, provides relevant information, such as code examples and links to relevant documents. The following table provides the data fields stored in the ID chip with content examples.

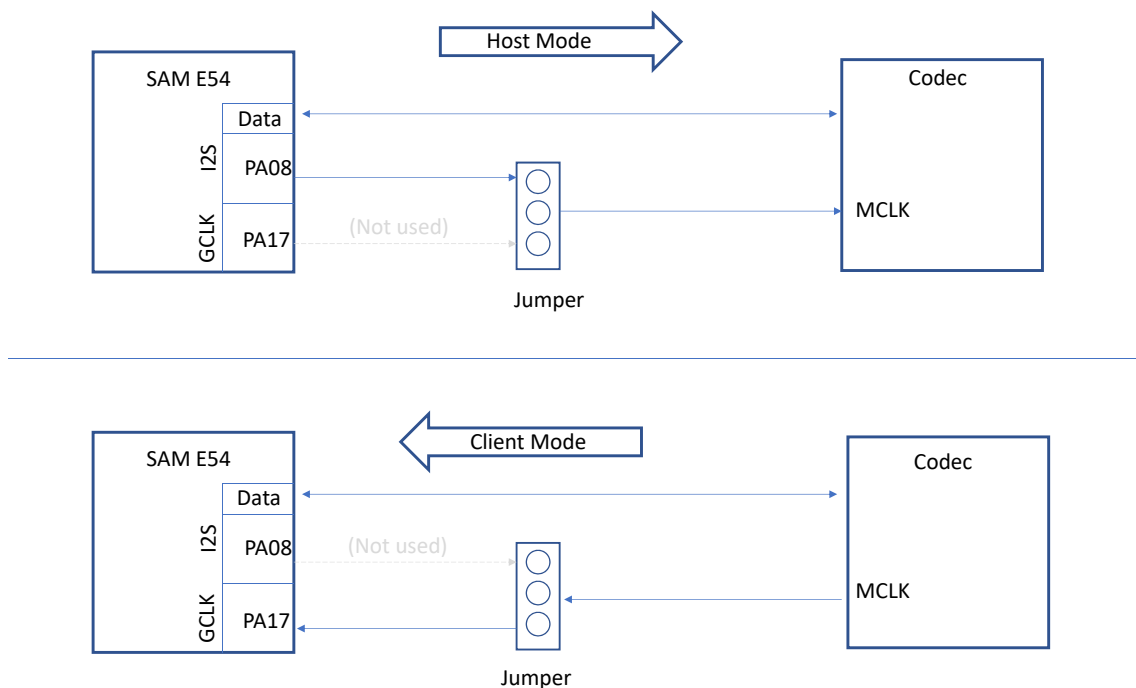
Table 1-4. Xplained Pro ID Chip Content Example

Data Field	Data Type	Example
Manufacture	ASCII string	Microchip\0'
Product Name	ASCII string	-
Product Revision	ASCII string	04\0'
Product Serial number	ASCII string	1774020200000010\0'
Minimum Voltage (mV)	uint16_t	3000
Maximum Voltage (mV)	uint16_t	3600
Maximum Current (mA)	uint16_t	30

1.5 Audio Clock Selection

The SAM E54 has two ways of supporting I²S audio applications: Host mode and Client mode. This refers to which mode generates the I²S Host clock, and it also known as a reference clock. The following figure shows the relationship between the devices. On this board there is a jumper to select between the two modes, Host mode and Client mode. The usable modes also depend on which codec it supports, as not all codecs can support both the modes.

Figure 1-4. Audio Clock Selection



1.5.1 Pinout

The following table provides the pinout for the X32 Audio Interface. See [Schematics](#) for additional information.

Table 1-5. Pinout

Pin Number	Name	Description	Interface
1	GND	Ground	Power
2	GND	Ground	Power
3	UART RX	UART RX, receive to MCU from DB	UART
4	UART CTS	UART Clear to send	UART
5	UART TX	UART TX, transmit from MCU to DB	UART
6	UART RTS	UART Ready to send	UART
7	I ² C SCL	Clock line for I ² C interface.	I ² C
8	STBY/RST	Standby/Reset control	GPIO
9	I ² C SDA	Data line for I ² C interface.	I ² C
10	Audio WS/LRCLK	Audio Word Select/Left Right Clock	I ² S
11	Audio In	Audio into MCU, out from codac	I ² S
12	Audio CLK	Audio clock	I ² S
13	Audio out	Audio out of MCU, into codac/DAC	I ² S
14	REFCLK/MCK	Reference clock #1	REFCLK

.....continued

Pin Number	Name	Description	Interface
15	GND	Ground	Power
16	GND	Ground	Power
17	NC	Legacy hold over	-
18	+3.3v	VDD	Power
19	NC	Legacy hold over	-
20	+5.0v	VDD	Power
21 (1)	NC	NC	-
22 (2)	ADC/Card ID pin	Analog-to-Digital Converter to read voltage on the daughter card	1-wire
23 (3)	NC	NC	-
24 (4)	NC	NC	-
25 (5)	NC	NC	-
26 (6)	NC	NC	-
27 (7)	NC	NC	-
28 (8)	NC	NC	-
29 (9)	NC	NC	-
30 (10)	NC	NC	-
31 (11)	GND	Ground	Power
32 (12)	GND	Ground	Power

1.5.2 X32 Port Connections

The following table provides the port and connection details of the X32 audio interface. The I²S signals listed are the Main signals, and both the signals are available at each interface.

Table 1-6. X32 Port Connections

Interface	X32
UART RX	PC13
UART TX	PC12
UART RTS	PC14
UART CTS	PC15
I ² C SDA	PD09
I ² C SCL	PD08
Reset	PC18
REFCLK	PA08/PA17 (refer to Figure 1-4 Audio Clock Selection)
I ² S Clock	PA10
I ² S Audio Out (MOSI)	PA11
I ² S Audio In (MISO)	PB10
I ² S LRCLK	PA09

1.6 mikroBUS

The mikroBUS interface enables using additional click boards. For more information, and to see the boards that can be used with this development board follow the link: <https://www.mikroe.com/>.

Note: Some of these pins are shared with the X32 audio interface. Due to location, an X32 audio card cannot be used simultaneously as the click interface due to mechanical interference.

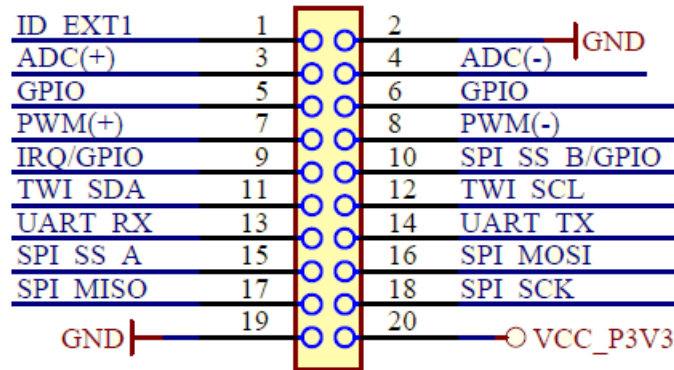
1.7 Xplained Pro Standard Extension Header

All Xplained Ultra and Curiosity Ultra Kits have many dual-row, 20-pin, and 100 mil extension headers. Xplained Ultra and Curiosity Ultra MCU boards have male headers, while Xplained Ultra extensions have their female counterparts as shown in the following figure.

Note: All pins are not always connected.

The extension headers can be used to connect a variety of Xplained Pro extensions to Xplained Ultra and Curiosity Ultra MCU boards, or to access the pins of the target MCU on Xplained Ultra MCU or Curiosity Ultra boards directly.

Figure 1-5. Extension Headers



All connected pins follow the defined pinout description as shown in the following table.

Table 1-7. Xplained Pro Standard Extension Header

Pin number	Name	Description
1	ID	Communication line to the ID chip on an extension board
2	GND	Ground
3	ADC(+)	Analog-to-Digital Converter (ADC), alternatively positive part of differential ADC
4	ADC(-)	Analog-to-Digital Converter (ADC), alternatively negative part of differential ADC
5	GPIO1	General purpose I/O
6	GPIO2	General purpose I/O
7	PWM(+)	Pulse-Width Modulation (PWM), alternatively positive part of differential PWM
8	PWM(-)	Pulse-Width Modulation (PWM), alternatively negative part of differential PWM
9	IRQ/INT/GPIO	Interrupt request line and general purpose I/O
10	SPI SS B/GPIO	SPI Client Select or general purpose I/O
11	I ² C SDA	Data line for I ² C interface. Always implemented, bus type
12	I ² C SCL	Clock line for I ² C interface. Always implemented, bus type
13	UART RX	Receiver line of target device UART
14	UART TX	Transmitter line of target device UART
15	SPI SS A/GPIO	SPI Client Select or general purpose I/O
16	SPI MOSI	Host Out Client In line of serial peripheral interface. Always implemented, bus type.
17	SPI MISO	Host In Client Out line of serial peripheral interface. Always implemented, bus type.
18	SPI SCK	Clock for serial peripheral interface. Always implemented, bus type.
19	GND	Ground
20	V _{CC}	Power for extension boards (3.3V)

1.8 Graphics Connectors or GFX Card Interface

The SAM E54 Curiosity Ultra development kit is designed to have a modular graphics interface. This interface enables the use of several different graphics cards, which allows for expandability and different use cases. A 24-bit pass through card is included with the kit, this board passes parallel data through, and can be configured to an 8-bit 8080 MCU mode. This card also provides access to the ADC for resistive touch screen or self-drive PTC touch screens. Refer to the following table for pin description.

Table 1-8. Graphics Interface Pinout

Pin Number	Name	Description
1	GND	Ground
2	GND	Ground
3	MCLR	Host Clear Reset controlled by the debuggers. Allows for a complete system reboot.
4	IRQ1 (LCD Touch)	Interrupt request line for cap touch device
5	5.0V V _{CC}	5.0V
6	IRQ2 (Q Touch)	Interrupt request line for Q touch devices
7	LCDEN	LCD Data Enable
8	IRQ3 (Display Controllers)	Interrupt request line for external display controllers
9	LCDHSYNC/NCS3	LCD Horizontal Sync or GPIO
10	IRQ4 (Resistive touch)	Interrupt request line for resistive touch controllers
11	LCDVSYNC/nWE	LCD Vertical Sync, CS, or GPIO
12	5.0v V _{CC}	+5.0v
13	LCDPCK/nRD	LCD pixel clock, Write Enable or GPIO
14	I ² C SDA	Data line for I ² C interface. Always implemented, bus type.
15	LCD D0	LCD Data bit 0
16	I ² C SCL	Clock line for I ² C interface. Always implemented, bus type.
17	LCD D1	LCD Data bit 1
18	SPI SCK	Clock for serial peripheral interface. Always implemented, bus type.
19	LCD D2	LCD Data bit 2
20	SPI MOSI	Host Out Client In line of serial peripheral interface.
21	LCD D3	LCD Data bit 3
22	SPI MISO	Host In Client Out line of serial peripheral interface.
23	LCD D4	LCD Data bit 4
24	SPI SS	SPI Client Select
25	LCD D5	LCD Data bit 5
26	UART RX	Receiver line of target device UART
27	LCD D6	LCD Data bit 6
28	UART TX	Transmitter line of target device UART (from MCU to GFX card).
29	LCD D7	LCD Data bit 7
30	UART RTS	UART Ready-To-Send (from MCU to GFX card)
31	LCD D8	No Connect
32	UART CTS	UART Clear-To-Send (from MCU to GFX card)
33	LCD D9	No Connect
34	LCD PWM	LCD PWM back light control
35	LCD D10	No Connect
36	PWM2	Pulse-Width Modulation (PWM)
37	LCD D11	No Connect
38	GPIO1	General purpose I/O

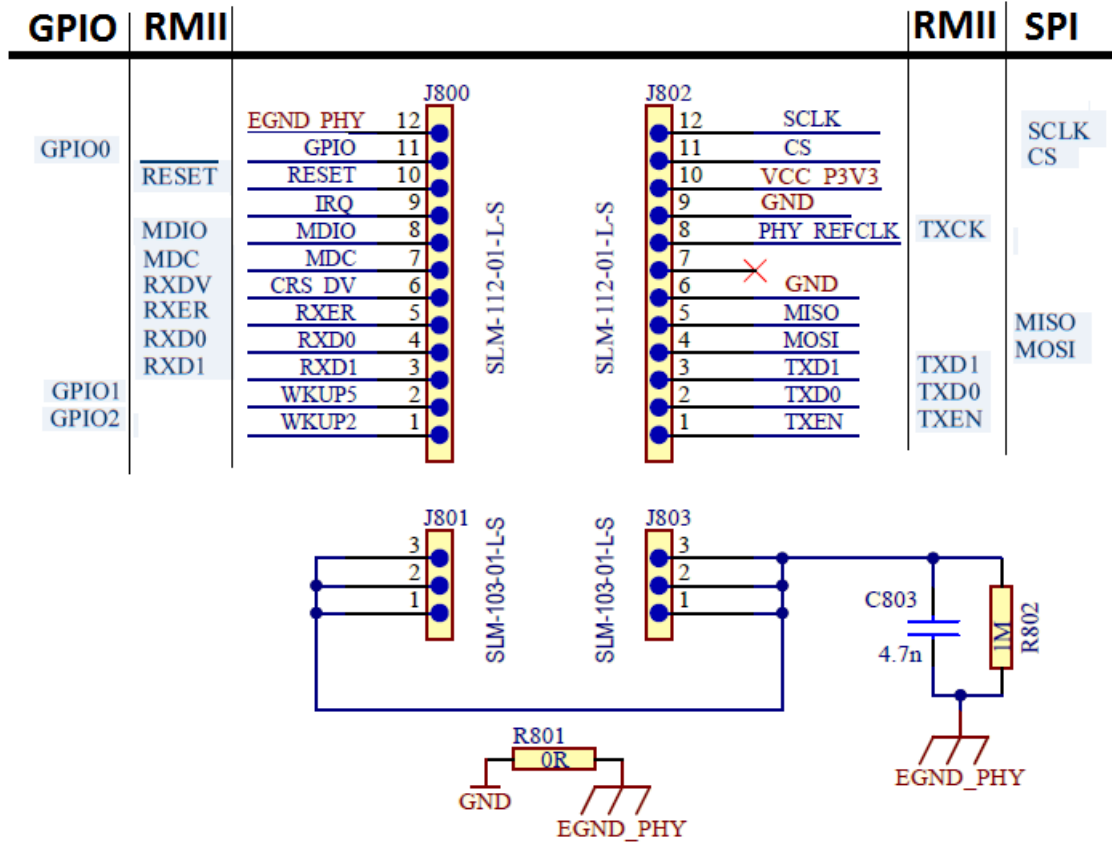
.....continued

Pin Number	Name	Description
39	LCD D12	No Connect
40	GPIO2	General purpose I/O
41	LCD D13	No Connect
42	GPIO3	General purpose I/O
43	LCD D14	No Connect
44	STBY/RST/GPIO4	Standby/Reset or general purpose I/O. For resetting devices attached to the GFX connector.
45	LCD D15	No Connect
46	STBY/RST/GPIO5	Standby2/Reset2 or general purpose I/O
47	LCD D16	No Connect
48	ID pin	Communication line to the ID chip on an extension board.
49	LCD D17	No Connect
50	ADC 0	Analog-to-Digital Converter to MCU
51	LCD D18	No Connect
52	ADC1	Analog-to-Digital Converter to MCU
53	LCD D19	No Connect
54	ADC2	Analog-to-Digital Converter to MCU
55	LCD D20	No Connect
56	ADC3	Analog-to-Digital Converter to MCU
57	LCD D21	No Connect
58	ADC4	Analog-to-Digital Converter to MCU
59	LCD D22	No Connect
60	ADC5	Analog-to-Digital Converter to MCU
61	LCD D23	No Connect
62	ADC6	Analog-to-Digital Converter to MCU
63	3.3V V _{CC}	+3.3V V _{CC}
64	ADC7	Analog-to-Digital Converter to MCU
65	GND	Ground
66	3.3V V _{CC}	+3.3V V _{CC}
67	GND	Ground
68	GND TAB	Mounting Tab
69	GND TAB	Mounting Tab

1.9 Ethernet

The SAM E54 Curiosity Ultra development kit has a modular Ethernet PHY system that enables different PHYs to be plugged into the board. This interface is setup to use a Reduced Media-Independent Interface (RMII) and a SPI bus interface with GPIO. The following figure illustrates the Ethernet PHY header configuration.

Figure 1-6. Ethernet PHY Header Configuration



The following table provides the Ethernet PHY interface pinout descriptions.

Table 1-9. Ethernet Interface Pinout Description

Pin Number	Name	Description
1	GPIO	General purpose I/O
2	GPIO	General purpose I/O
3	RXD1	Receive Data 1
4	RXD0	Receive Data 0
5	RXER	Receive Error
6	RXDV	Receive Data Valid
7	MDC	-
8	MDIO	-
9	IRQ	Interrupt request line
10	RESET	Reset control to the Ethernet PHY
11	GPIO	General purpose I/O
12	EGND	Shield Ground
13 (1)	TXEN	Transmit Enable
14 (2)	TXD0	Transmit Data
15 (3)	TDX1	Transmit Data
16 (4)	MOSI	Host Out Client In line of serial peripheral interface
17 (5)	MISO	Host In Client Out line of serial peripheral interface
18 (6)	GND	Ground

.....continued

Pin Number	Name	Description
19 (7)	NC	No Connect
20 (8)	REFCLK (in)	Reference Clock input (50 MHz)
21 (9)	GND	GND
22 (10)	+3.3V V _{DD}	+3.3V V _{DD}
23 (11)	CS	Chip Select for serial peripheral interface
24 (12)	SCK	Clock for serial peripheral interface
25 -30	EGND	Shield Ground

1.10 AT24MAC402 Serial EEPROM

The development board has an on-board 2-Kbit I²C serial EEPROM which is available for user applications. This serial EEPROM has a unique EUI-48, and 128-bit serial number. The unique number can be seen in the Microchip MPLAB Kit window or Atmel® Studio Xplained window after the kit has been plugged into the PC.

Users can change the device address using the solder pads on the board, but all address bits have been defaulted to one. Refer to [schematics](#) for additional information. For additional usage information of on this part, refer to the “AT24MAC402 and AT24MAC602 Data Sheet” available for download from the Hardware Features, or from the following location: <http://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-8807-EEPROM-AT24MAC402-602-Datasheet.pdf>.

The following are the default address for the devices:

AT24MAC_I2C_EEPROM_ADDR 0b1010110 //0x56 (7 bit)

AT24MAC_I2C_EXTENDED_ADDR 0b1011110 //0x5E (7 bit)

1.11 On-Board External Temperature Sensor

This development kit has an on-board external I²C-based temperature sensor for application use. The external sensor is a MCP8908. The temperature sensor has a user programmable temperature alert output and a user programmable temperature limits with a typical accuracy of +/-0.25°C.

This part has an I²C address of 0x18h. For additional information, refer to the “±0.5°C Maximum Accuracy Digital Temperature Sensor” document, which is available for download from the following location: <http://ww1.microchip.com/downloads/en/DeviceDoc/25095A.pdf>.

1.12 Hardware Features

The starter kit provides the following two push button switches: User switch and Reset switch. The push button switches do not have any debounce circuitry and require the use of internal pull-up resistors. This enables the user to investigate the software debounce techniques. When Idle, the switches are pulled high (+3.3V,) and when pressed, they are grounded.

2. Hardware

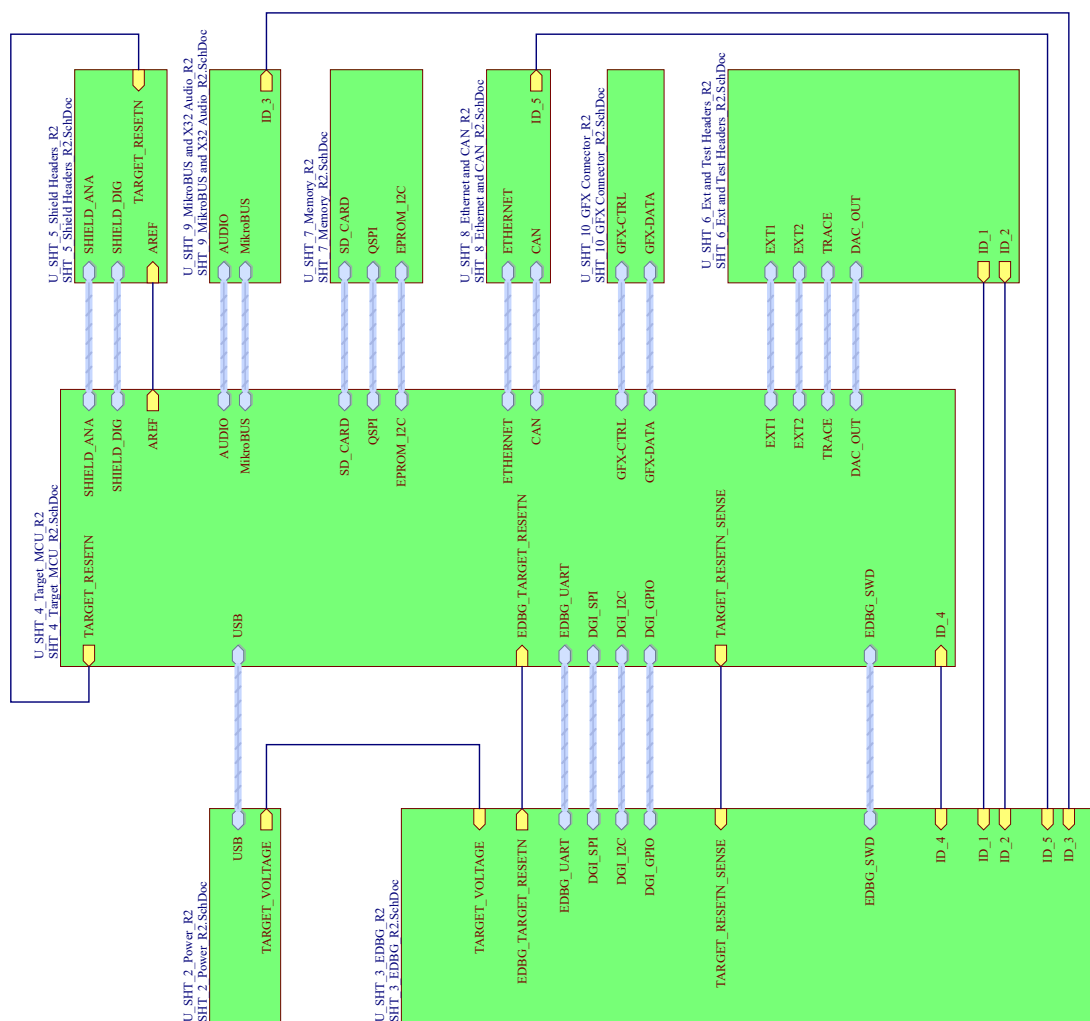
2.1 Schematics

This section contains the schematics by default for the board:

- Block Diagram Schematic, [Figure 2-1](#)
- Power Schematic, [Figure 2-2](#)
- EDBG Schematic, [Figure 2-3](#)
- MCU Schematic, [Figure 2-4](#)
- Arduino UNO Schematic, [Figure 2-5](#)
- Extension and Test Headers Schematic, [Figure 2-6](#)
- Memory Schematic, [Figure 2-7](#)
- Ethernet and CAN Schematic, [Figure 2-8](#)
- mikroBUS and X32 Audio Schematic, [Figure 2-9](#)
- GFX Connector Schematic, [Figure 2-10](#)

Figure 2-1. Block Diagram Schematic

SAM E54 Curiosity Ultra V2



EV66Z56A
A09-3479 (SAME54 CULT V2 Eval Kit)
A08-2808 (Box Label)
A09-3489 (SAME54 CULT V2 Eval Kit ESD Bag)
A09-0608 (ESD Bag)
A09-0604 (Bag Label)
A09-3488 (SAM E54 CULT V2 PCBA)
A09-0611 (Label PCBA)
A12-1516 (SAM E54 CULT V2 PCBA Doc)
A08-3181 (SAM E54 CULT V2 PCB)
A11-0196 (EDBG secured firmware)
A12-1515 (SAM E54 CULT V2 Test Document)
A11-0514 (SAM E54 CULT V2 Test Software)
A09-3296 (24 Bit PT Graphics Board PCBA)

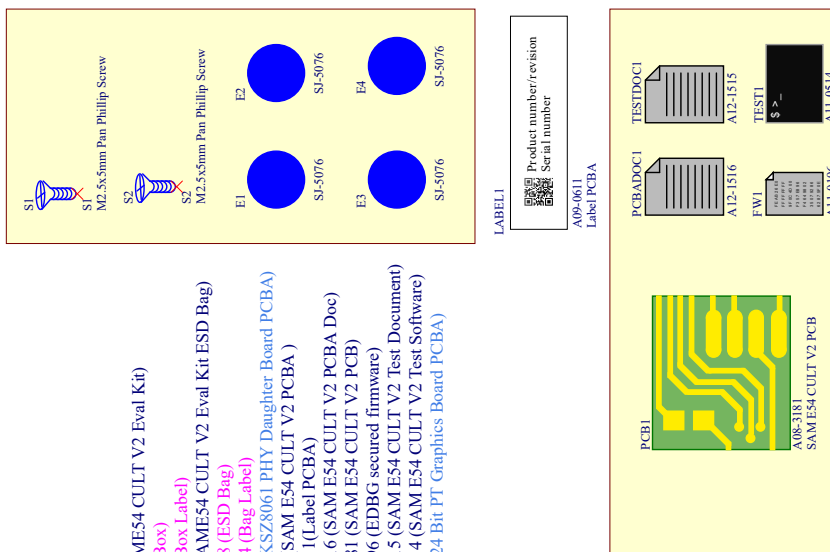


Figure 2-2. Power Schematic

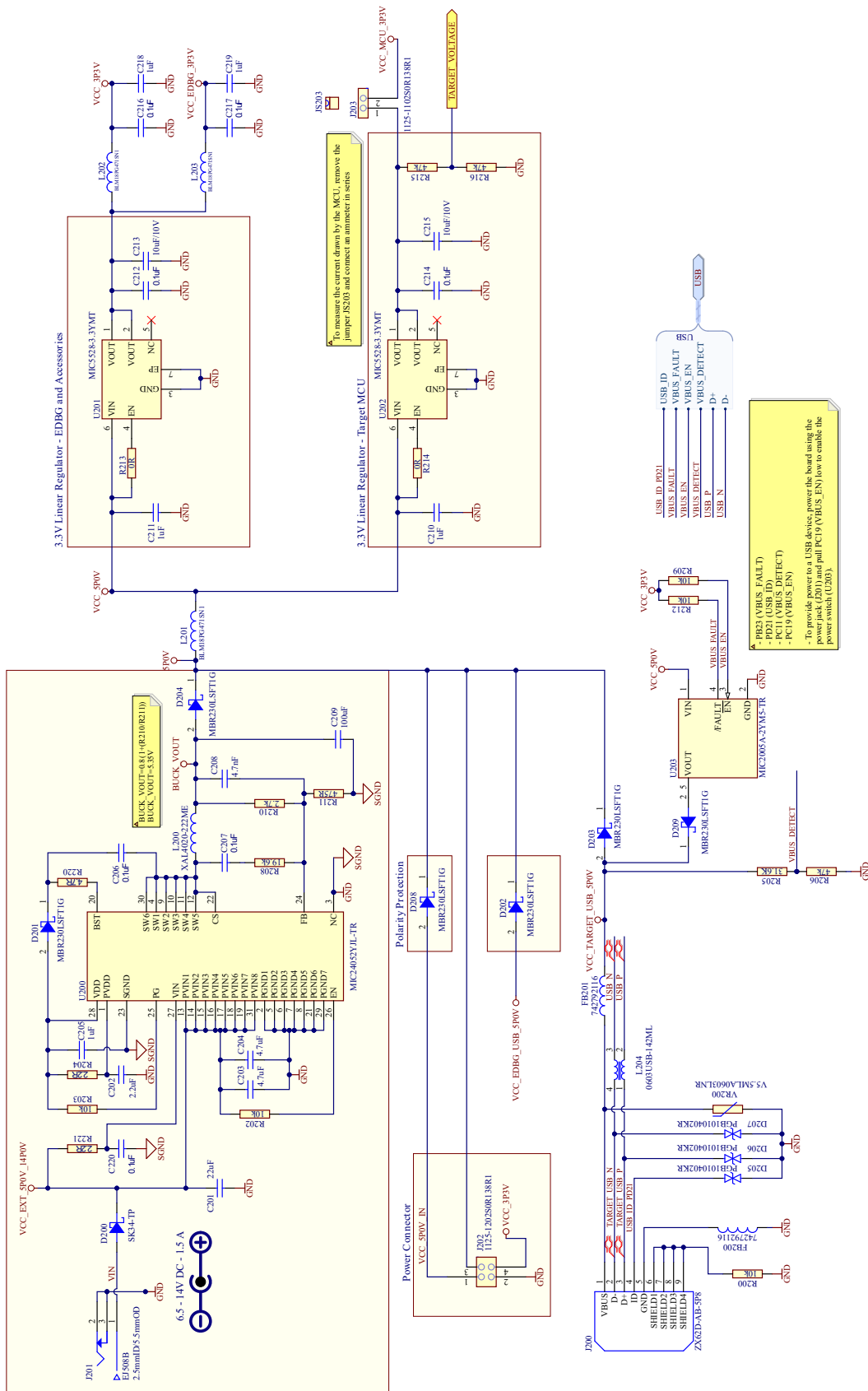


Figure 2-3. EDBG Schematic

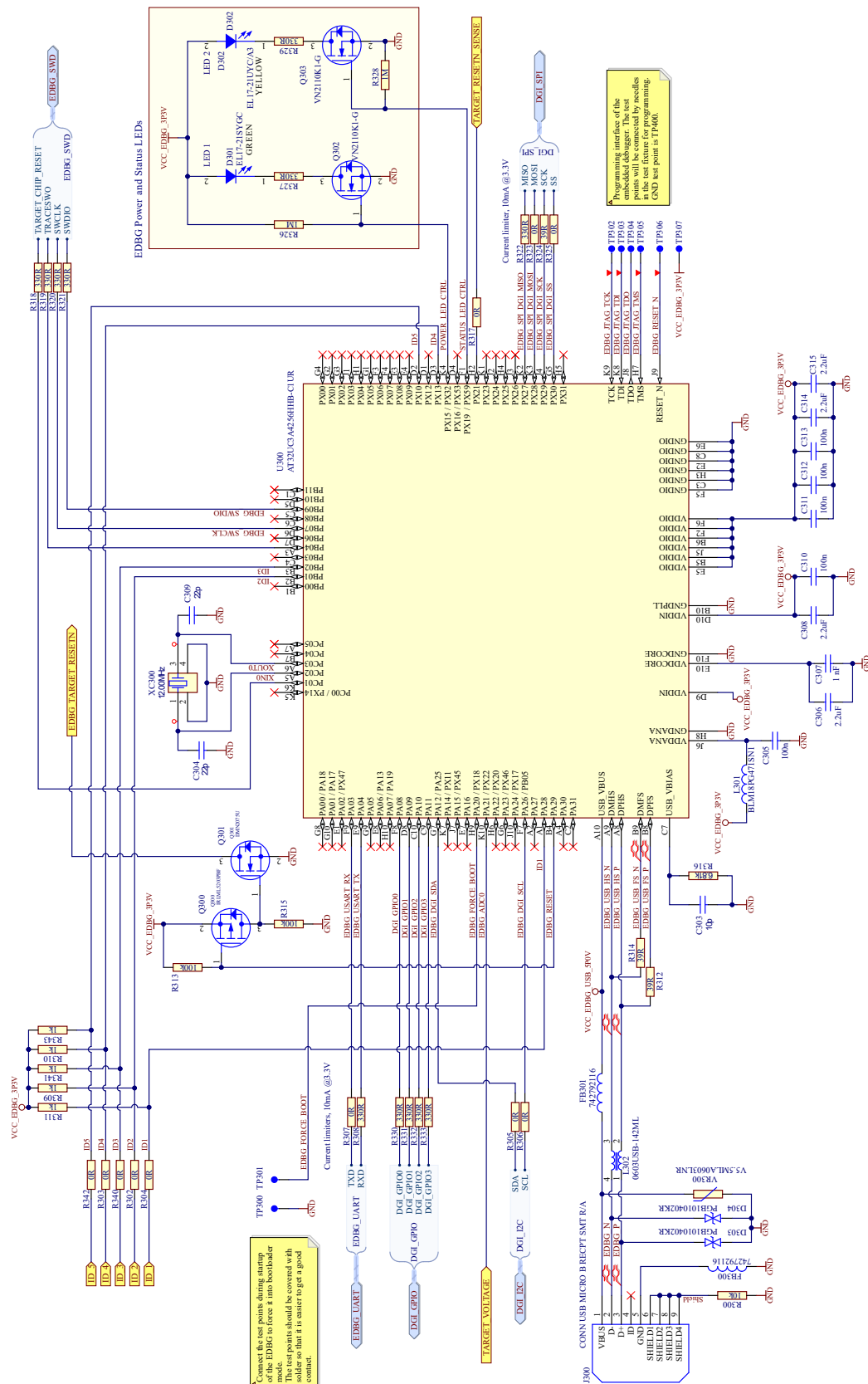


Figure 2-4. MCU Schematic

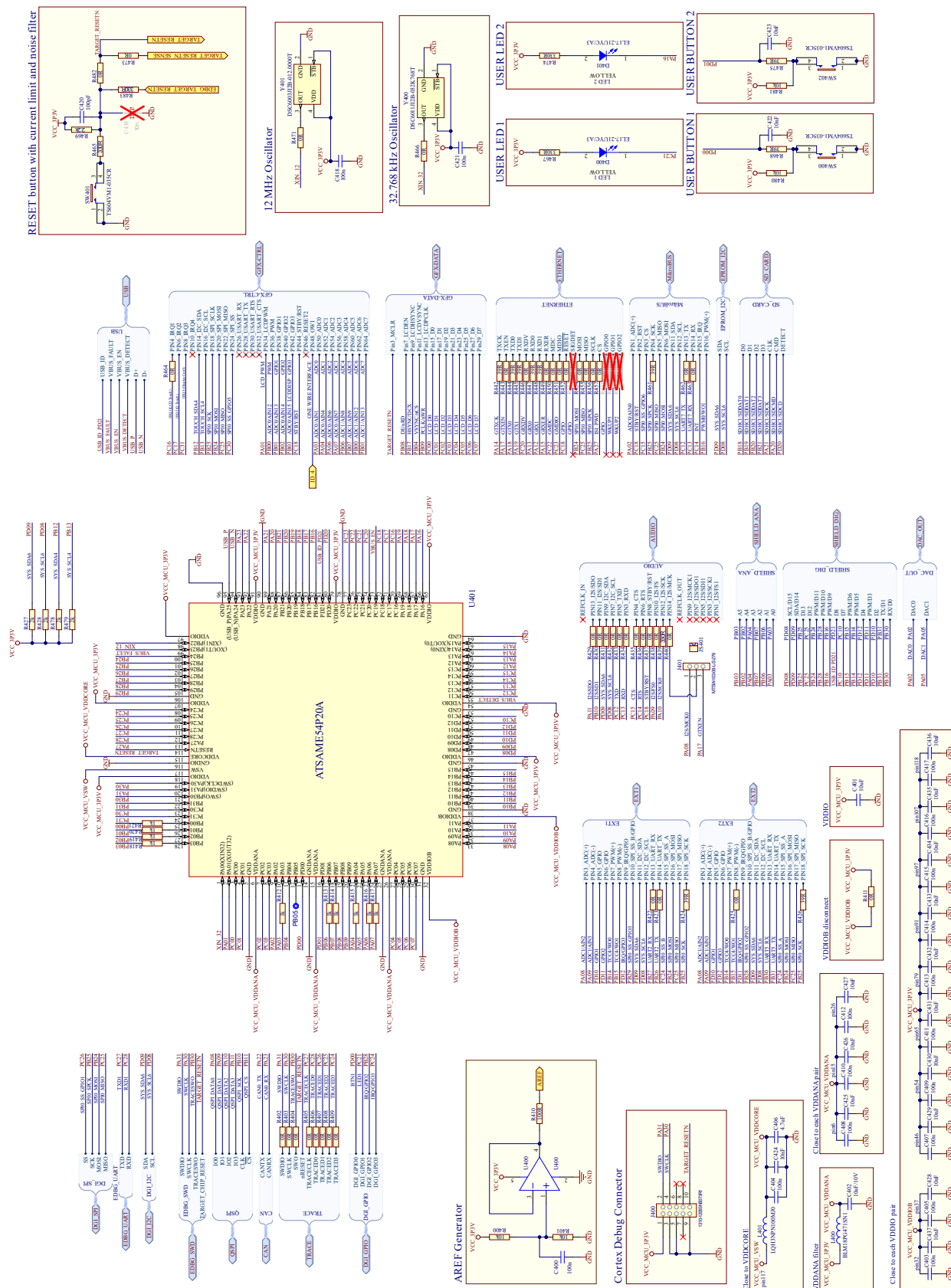


Figure 2-5. Arduino UNO Schematic

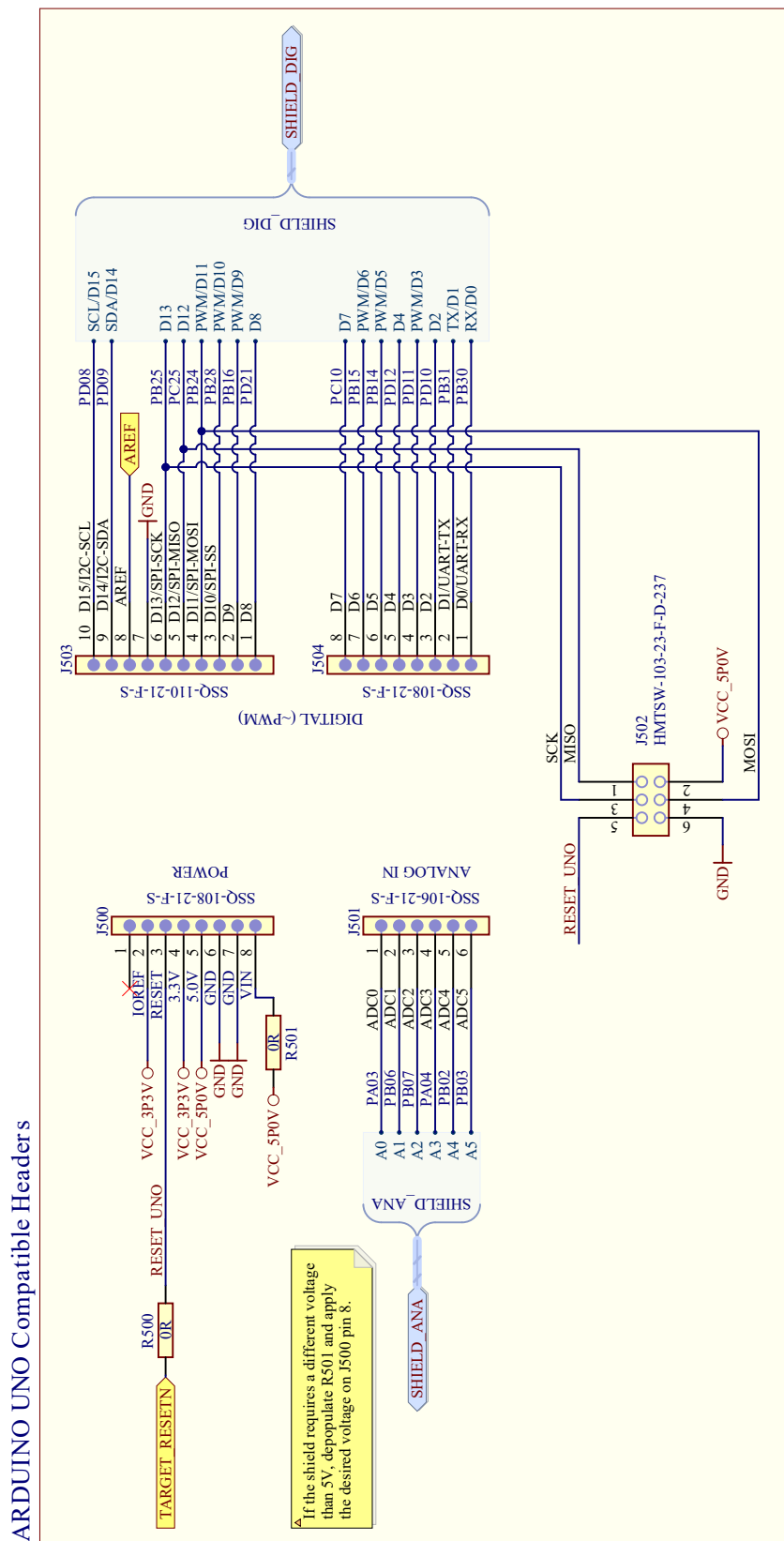


Figure 2-6. Extension and Test Headers Schematic

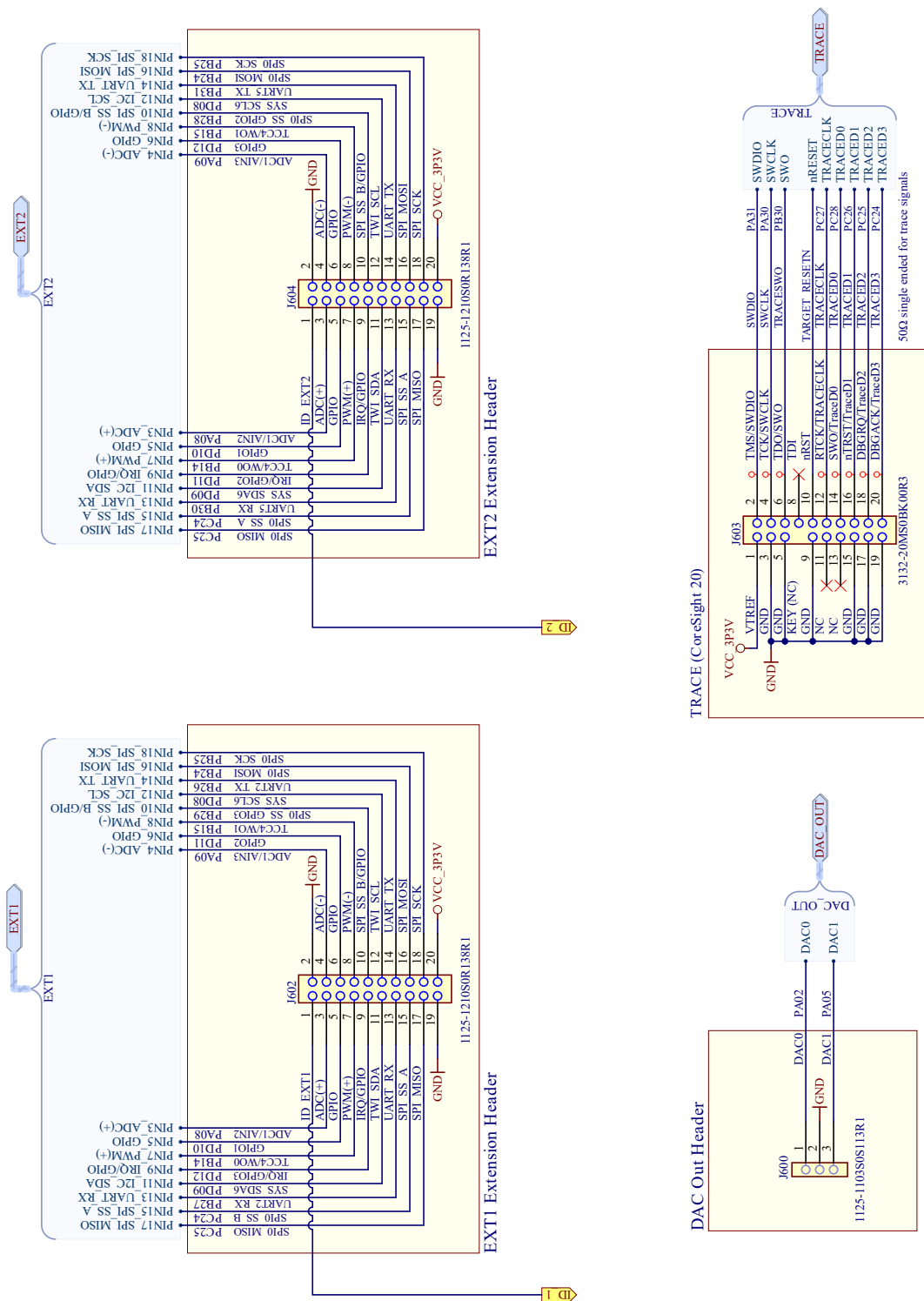


Figure 2-7. Memory Schematic

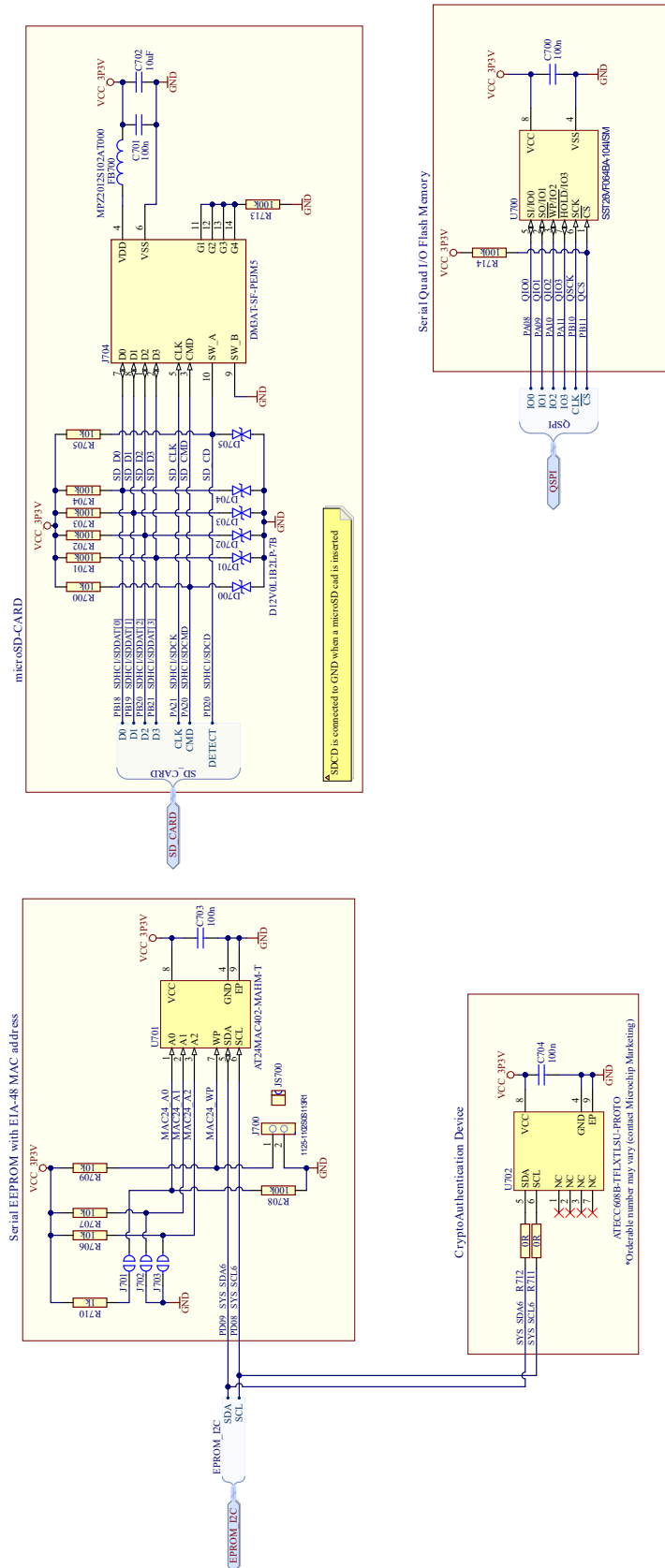


Figure 2-8. Ethernet and CAN Schematic

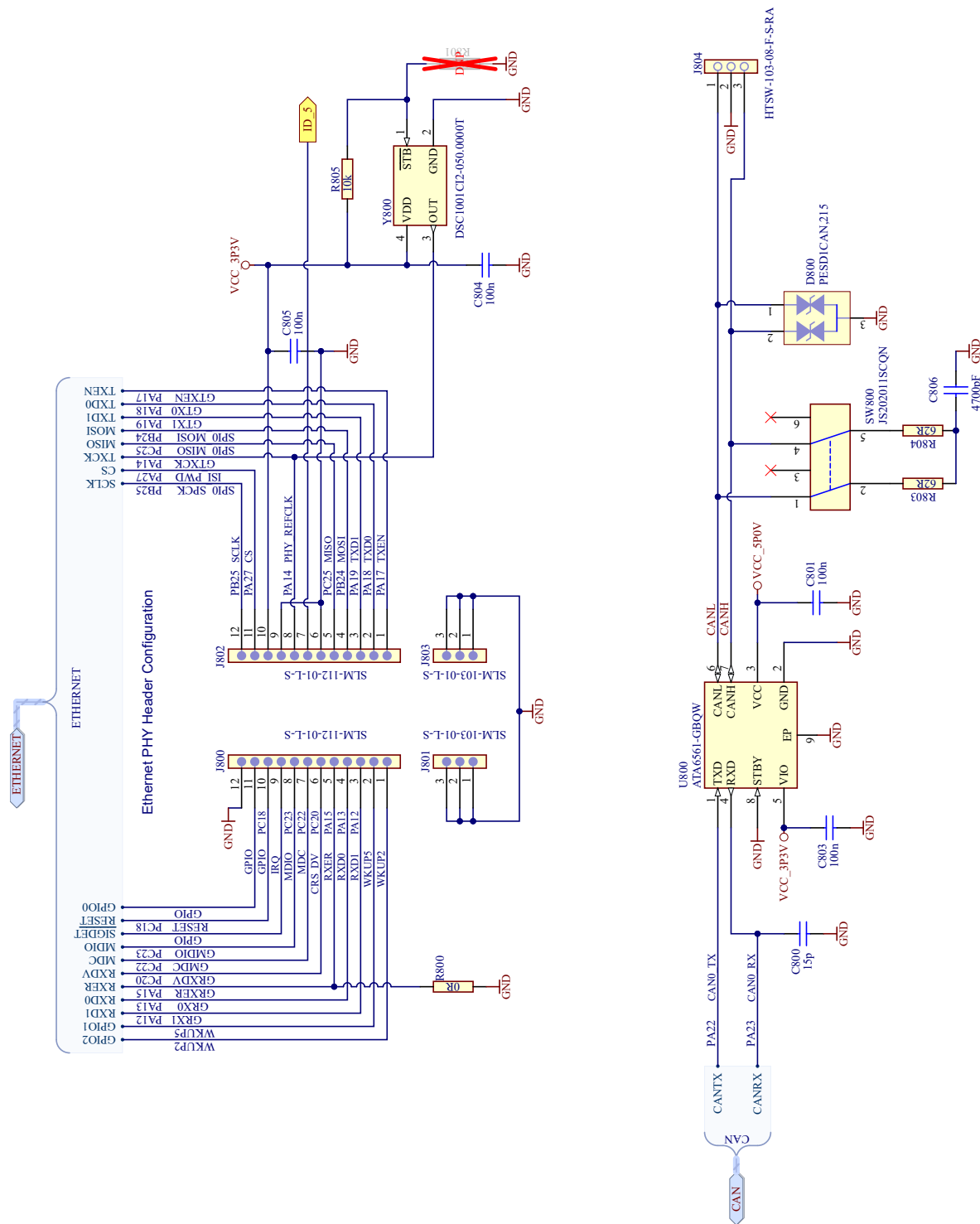


Figure 2-9. mikroBUS and X32 Audio Schematic

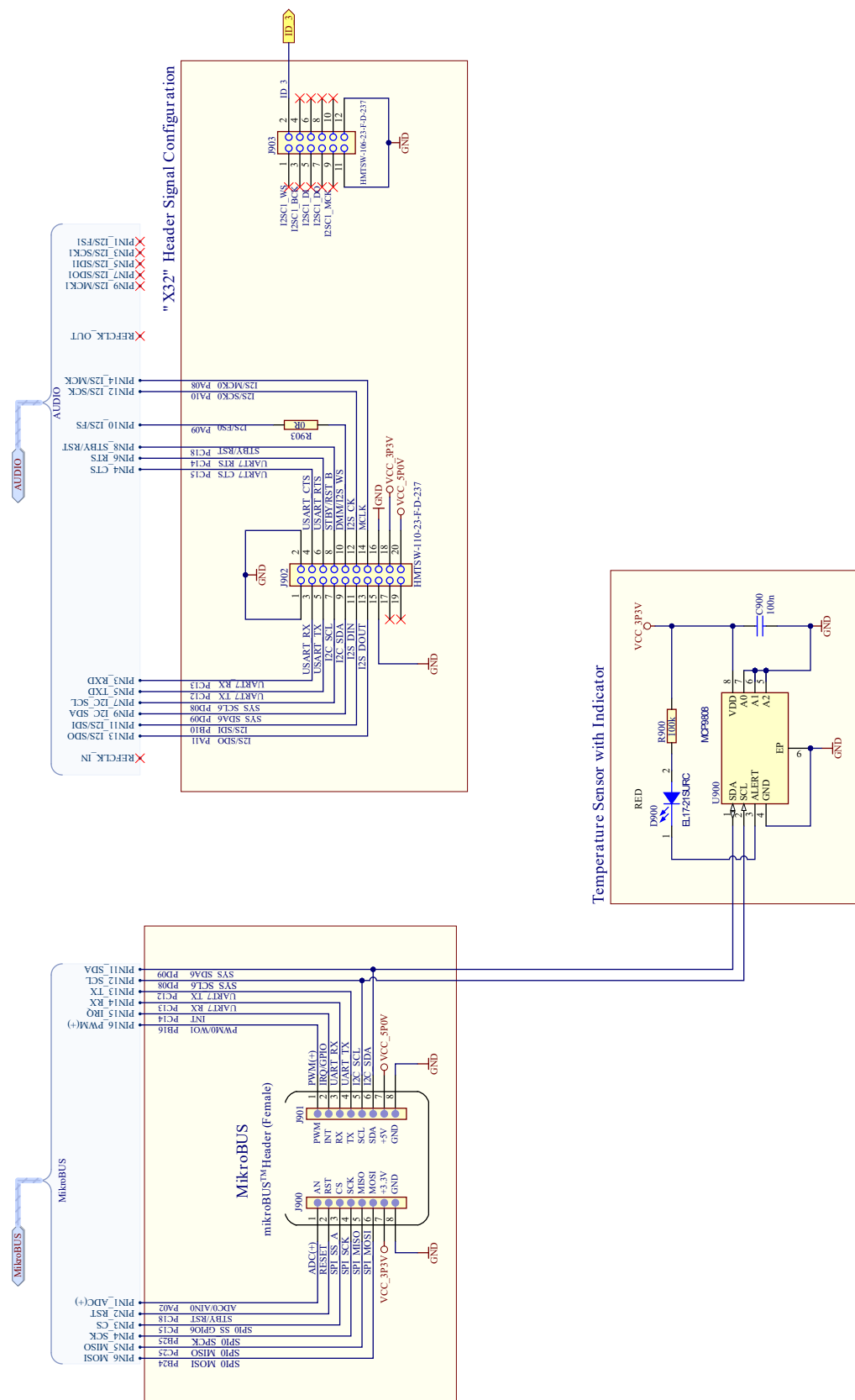
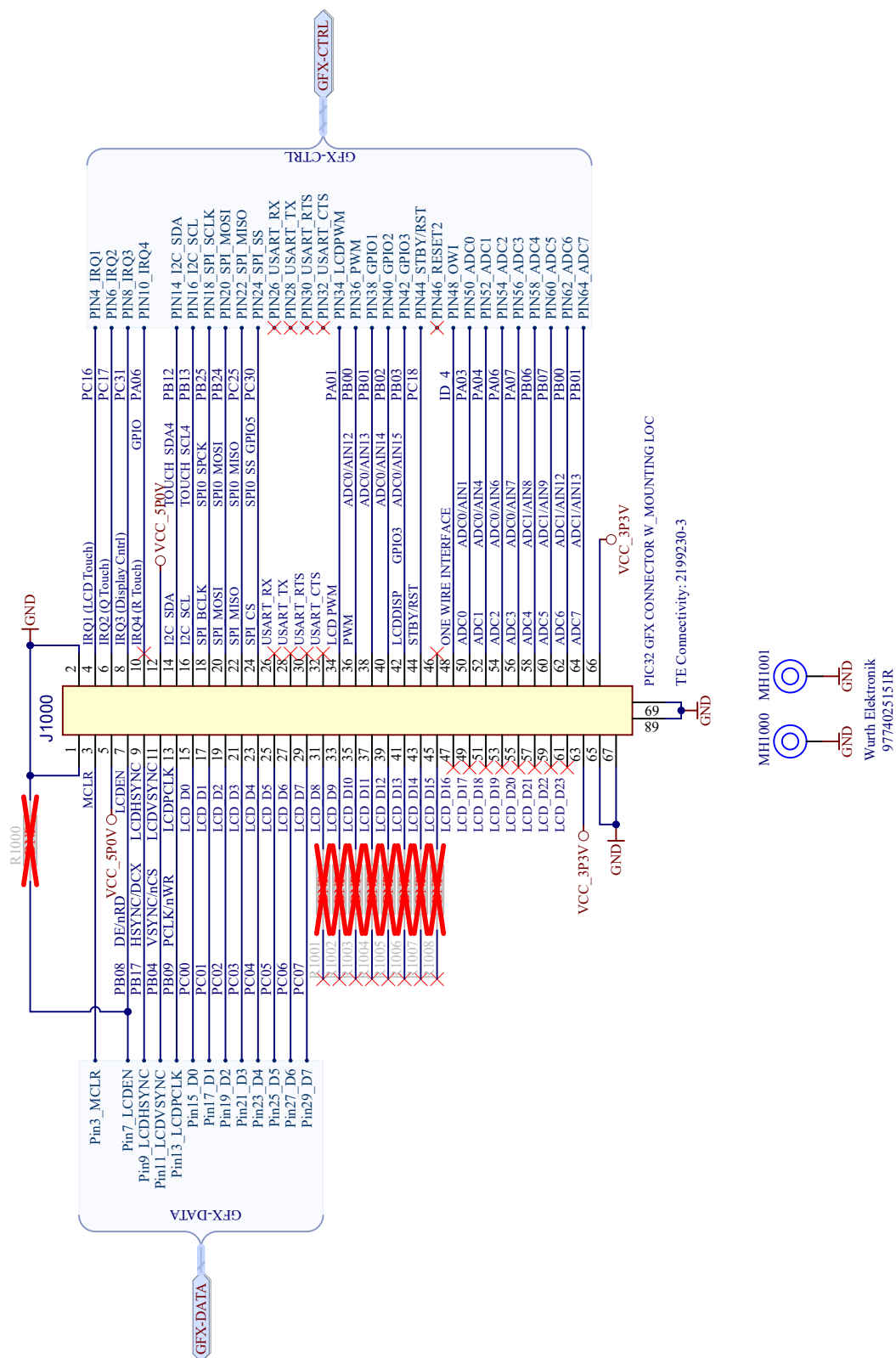


Figure 2-10. GFX Connector Schematic



2.2 Bill of Materials

Table 2-1. Bill of Materials

Qty	Designator	MPN	Manufacturer	Value	Description
1	C201	GRM31CR61E226KE15L	Murata	22 uF	Ceramic capacitor, SMD 1206, X5R, 25V, 10%
1	C202	GRM21BR61E225KA12L	Murata	2.2 uF	Ceramic capacitor, SMD 0805, X5R, 25V, 10%, (de20024)
2	C203, C204	GRM21BR61E475KA12L	Murata	4.7 uF	Ceramic capacitor, SMD 0805, X5R, 25V, $\pm 10\%$
5	C205, C210, C211, C218, C219	0603YD105KAT2A	AVX	1 uF	CAP CER 1UF 16V 10% X5R 0603
7	C206, C207, C212, C214, C216, C217, C220	CGA2B3X7R1H104K	tdk	0.1 uF	CAP CER 0.1UF 50V 10% X7R 0402
1	C208	2238 587 15632	PHYCOMP	4.7 nF	Ceramic capacitor, SMD 0402, X7R, 25V, $\pm 10\%$ (de35287)
1	C209	EMK325ABJ107MM-T	Taiyo Yuden	100 uF	Ceramic capacitor, SMD 1210, X5R, 16V, 20%
4	C213, C215, C401, C402	0603ZD106MAT2A	AVX	10 uF/10 V, 10 uF	Ceramic capacitor, SMD 0603, X5R, 10V, 10UF $\pm 20\%$
1	C303	04025A100JAT2A	AVX	10p	Ceramic capacitor, SMD 0402, NP0, 50V, $\pm 5\%$
2	C304, C309	CC0402JRNPO9BN220	YAGEO CORP	22p	Ceramic capacitor, SMD 0402, NP0, 50V, $\pm 5\%$
31	C305, C310, C311, C312, C313, C400, C403, C404, C405, C407, C408, C409, C410, C411, C412, C413, C414, C415, C416, C417, C418, C421, C700, C701, C703, C704, C801, C803, C804, C805, C900	C0402C104K4RACTU	Kemet	100n	Ceramic capacitor, SMD 0402, X7R, 16V, $\pm 10\%$
4	C306, C308, C314, C315	C0402C225M9PAC	Kemet	2.2 uF	Ceramic capacitor, SMD 0402, X5R, 6.3V, $\pm 20\%$
1	C307	GRM1555C1H102JA01D	Murata	1 nF	Ceramic capacitor, SMD 0402, C0G, 50V, $\pm 5\%$
1	C406	0603X475K100CT	WALSIN Technology Corporation	4.7 uF	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (de31036)
1	C420	CL05C101JB5NNNC	Samsung	100 pF	Ceramic Capacitor, SMD 0402, COG, 50V, $\pm 5\%$
16	C422, C423, C424, C425, C426, C427, C428, C429, C430, C431, C432, C433, C434, C435, C436, C437	GRM155R71E103KA01D	Murata	10 nF	Ceramic capacitor, SMD 0402, X7R, 25V, 10%
1	C702	GRM21BR61A106KE19L	Murata	10 uF	Ceramic capacitor, SMD 0805, X5R, 10V, 10 %, (de19441)
1	C800	04025A150JAT2A	AVX	15p	Ceramic capacitor, SMD 0402, NP0, 50V, $\pm 5\%$
1	C806			4700 pF	Ceramic capacitor, SMD 0805, X7R, 50V, $\pm 10\%$
1	D200	SK34-TP	Micro Commercial Components Corp.	SK34-TP	Schottky Diode 3A, 40V Vf = 500 mA SK34-TP DO-214AB
6	D201, D202, D203, D204, D208, D209	MBR230LSFT1G	ON Semiconductor	MBR230LSFT1G	2A, 30V, Vf=0.43V, Schottky diode ,SOD-123FL Pb-Free, RoHS
5	D205, D206, D207, D303, D304	PGB1010402KR	Littelfuse	PGB1010402KR	Bidirectional TVS diode, 12VWM 250VC 8kW 0402
1	D301	EL17-21SYGC	Everlight	EL17-21SYGC	LED, Green, Wave length = 575 nm, SMD 0805, $\pm 70^\circ$
3	D302, D400, D401	17-21UYC/S530-A3/TR8	Everlight	EL17-21UYC/A3	LED, Yellow, Wave length = 591 nm, SMD 0805, $\pm 70^\circ$
6	D700, D701, D702, D703, D704, D705	D12V0L1B2LP-7B	Diodes Incorporated	D12V0L1B2LP-7B	Bidirectional TVS diode, 100W
1	D800	PESD1CAN,215	Nexperia	PESD1CAN,215	2-CH CAN TVS DIODE ARRAY 24Vrs 70V CLAMP 3A 200W AEC-Q101 SOT-23-3

.....continued					
Qty	Designator	MPN	Manufacturer	Value	Description
1	D900	EL17-21SURC	Everlight	EL17-21SURC	LED, Red, Wave length = 639 nm, SMD 0805, $\Delta\pm 70^\circ$
4	E1, E2, E3, E4	SJ-5076	3M	SJ-5076	2.8 mm adhesive feet, diam 8.0 mm
4	FB200, FB201, FB300, FB301	742792116	Würth Electronics	742792116	Ferrite Bead, 500 ohm@100 MHz, 2.5A, DCR = 0.060 ohm 1206 1LN
1	FB700	MPZ2012S102AT000	TDK	MPZ2012S102AT000	SMD RF inductor 0805, Z = 1 kOhm (@100 MHz), Max R(dc) = 0.15 Ohm, Max current = 1.5A
1	FW1		ATMEL	EDBG secured firmware	EDBG secured firmware
1	J200	ZX62D-AB-5P8(30)	HIROSE	ZX62D-AB-5P8	Micro USB AB Connector, Standard SMT + DIP
1	J201	EJ508B	Memory Protection Devices	EJ508B	DC Barrel Power Jack 12V 5A 2.5 mm ID 5.50 mm OD TH RA
1	J202	1125-1202S0R138R1	WCON HARDWARE ELECTRONICS CO., LTD	1125-1202S0R138R1	Pin header, 2x2, Right Angle, 2.54 mm, THT, Pin In Paste
1	J203	1125-1102S0R138R1	WCON HARDWARE ELECTRONICS CO., LTD	Pin header 1x2 RA	1x2 pin header, right angle, 2.54 mm pitch, through-hole
1	J300	10118194-0001LF	Amphenol	CONN USB MICRO B RECPT SMT R/A	micro B USB 2.0 Receptacle Connector 5 Position Surface Mount, Right Angle; Through Hole
1	J400	1310-1205SNS073R1	WCON HARDWARE ELECTRONICS CO., LTD	1310-1205SNS073R1	2x5 pin header, 1.27 mm pitch, THM
1	J401	MTSW-103-08-L-S-276	SAMTEC	MTSW-103-08-L-S-276	1x3 pin header, 2.54 mm pitch, THM
2	J500, J504	SSQ-108-21-F-S	SAMTEC	SSQ-108-21-F-S	1x8 receptacle pin header, low insertion force, 2.54mm pitch THM, Pin in Paste
1	J501	SSQ-106-21-F-S	SAMTEC	SSQ-106-21-F-S	1x6 receptacle pin header, low insertion force, 2.54 mm pitch THM
1	J502	HMTSW-103-23-F-D-237	SAMTEC	HMTSW-103-23-F-D-237	2x3 pin header, 2.54 mm pitch, Pin-in-Paste THM
1	J503	SSQ-110-21-F-S	SAMTEC	SSQ-110-21-F-S	1x10 receptacle pin header, low insertion force, 2.54 mm pitch THM, Pin in Paste
1	J600	1125-1103S0S113CR01	WCON	1125-1103S0S113R1	1x3 pin header, 2.54 mm pitch, Pin-in-Paste THM
2	J602, J604	1125-1210S0R138R1	WCON HARDWARE ELECTRONICS CO., LTD	1125-1210S0R138R1	Pin header, 2x10, Right Angle, 2.54 mm, THM, Pin In Paste
1	J603	3132-20MS0BK00R3	WCON HARDWARE ELECTRONICS CO., LTD	3132-20MS0BK00R3	50-mil header, shrouded, pin 7 removed, SMD
1	J700	1125-1102S0S113R1	WCON HARDWARE ELECTRONICS CO., LTD	1125-1102S0S113R1	1x2 pin header, 2.54 mm pitch, Pin-in-Paste THM
1	J704	DM3AT-SF-PEJM5	HIROSE	DM3AT-SF-PEJM5	Micro SD Card Connector, (8 + 2) Position Push - Push, SMT, Right Angle Gold
2	J800, J802	SLM-112-01-L-S	Samtec	SLM-112-01-L-S	1x12 - THM - Female Receptacle - 0.05 pitch
2	J801, J803	SLM-103-01-L-S	SAMTEC	SLM-103-01-L-S	1x3 - THM - Female Receptacle - 0.05 pitch
1	J804	HTSW-103-08-F-S-RA	SAMTEC	RT Pin Header 1X3	1x3 pin header, 2.54 mm pitch, Right angle THM, Pin-in-Paste
2	J900, J901	610-91-08GB00	PINREX TECHNOLOGY CORP.	610-91-08GB00	PINREX, 2.54 mm 1x8 Female Header Straight, THM, H = 8.5 mm, Gold Flash, Black Insulator
1	J902	1125-1210S0S113CR01	Cabcon A/S	HMTSW-110-23-F-D-237	2x10 pin header, 2.54 mm pitch, Pin-in-Paste THM, 1 mm hole
1	J903	HMTSW-106-23-F-D-237	SAMTEC	HMTSW-106-23-F-D-237	2x6 pin header, 2.54 mm pitch, Pin-in-Paste, 1 mm hole
1	J1000	2199230-3	TE Connectivity	PIC32 GFX CONNECTOR W_MOUNTING LOC	PIC32 GFX CONNECTOR W_MOUNTING LOC_2199230-3
3	JS203, JS401, JS700	3710-6001OS0B01	WCON		Jumper cap for 2.54 mm pinheader

.....continued					
Qty	Designator	MPN	Manufacturer	Value	Description
1	L200	XAL4020-222MEC	Coilcraft	XAL4020-222ME	2.2 μ H Shielded Power Inductor, 4x4x2 mm, Isat = 5.6A , Irms = 4.0A , DCR = 35.2 m Ω
5	L201, L202, L203, L301, L400	BLM18PG471SN1	Murata	BLM18PG471SN1	SMD RF inductor 0603. Z = 470 Ohm (@100 MHz), Max R(dc) = 0.65 ohm, Max current = 1A
2	L204, L302	0603USB-142ML	Coilcraft	0603USB-142ML	USB common-mode filter in 0603
1	L401	LQH3NPN100MJ0	Murata	LQH3NPN100MJ0	10 uH power inductor, Isat = 560 mA , Itemp = 710 mA, Rdc = 0.360 ohm
2	MH1000, MH1001	9774025151R	Würth Elektronik	ROUND SMT STANDOFF M2.5 H2.5 mm	Round Standoff Threaded M2.5x0.45 Steel 0.098" (H2.50 mm)
1	Q300	IRLML5203PBF	International Rectifier	IRLML5203PBF	P-ch. MOSFET. -30V, -3.0A continuous, -24A Peak. RDS(ON) = 0.098 ohm@VGS = -10V, RDS(ON) = 0.165 Ohm@VGS = -4.5V, -2.5V<VGS(th)<-1.0V
1	Q301	DMN2075U	Diodes Incorporated	DMN2075U	N-channel MOSFET, SOT23, 20V, 4.2A
2	Q302, Q303	VN2110K1-G	Microchip	VN2110K1-G	N-CH MOSFET, 100V 200 mA Rds On = 4 ohm@500 m1, 10V Vgs = 2.4V@1 mA SOT23-3
16	R200, R202, R203, R209, R212, R300, R400, R401, R480, R481, R700, R705, R706, R707, R709, R805	CRCW040210K0FKED	vishay	10k	Thick film resistor, SMD 0402, 1/16W, 1%
2	R204, R221			2.2R	Thick film resistor, SMD 0603, 1/10W, 1%
1	R205	RC0402FR-0731K6L	Yageo	31.6K	RES SMD 31.6K ohm 1% 1/16W 0402
3	R206, R215, R216	RK73H1ETTP4702F	KOA	47k	Thick film resistor, SMD 0402, 1/16W, 1%
1	R208	ERJ-2RKf1962X	Panasonic	RES 19.6K OHM 1% 1/16W 0402	RES 19.6K ohm 1% 1/16W 0402
1	R210	RC0402FR-072K7L	Yageo	2.7k	Thick film resistor, SMD 0402, 1/16W, 1%
1	R211	RC0402FR-07475RL	YAGEO CORP	RES SMD 475 OHM 1% 1/16W 0402	RES SMD 475 ohm 1% 1/16W 0402
59	R213, R214, R302, R303, R304, R305, R306, R307, R317, R323, R325, R340, R342, R402, R403, R404, R405, R406, R407, R408, R409, R411, R422, R423, R425, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R440, R443, R446, R449, R450, R451, R452, R454, R455, R456, R457, R462, R463, R464, R466, R471, R473, R482, R500, R501, R711, R712, R800, R903	RMCF0402ZTOR00	(n/a)	0R	RES 0.0 OHM 1/16W 0402 SMD
1	R220	CR10-4R70-FK	ASJ	4.7R	Thick film resistor, SMD 0402, 1/16W, 1%
17	R308, R318, R319, R320, R321, R322, R327, R329, R330, R331, R332, R333, R439, R465, R467, R474, R483	CR10-3300-FK	ASJ	330R	Thick film resistor, SMD 0402, 1/16W, 1%
16	R309, R310, R311, R341, R343, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R710	CR10-1001-FK	ASJ	1k	Thick film resistor, SMD 0402, 1/16W, 1%

.....continued					
Qty	Designator	MPN	Manufacturer	Value	Description
13	R312, R314, R324, R424, R426, R442, R444, R445, R447, R448, R461, R468, R475	CR10-39R0-FK	ASJ	39R	Thick film resistor, SMD 0402, 1/16W, 1%
10	R313, R315, R701, R702, R703, R704, R708, R713, R714, R900	CR10-1003-FK	ASJ	100k	Thick film resistor, SMD 0402, 1/16W, 1%
1	R316	CRCW04026K81FKED	vishay	6.81k	Thick film resistor, SMD 0402, 1/16W, 1%
2	R326, R328	RC0402FR-071ML	YAGEO CORP	1M	Thick film resistor, SMD 0402, 1/16W, 1%
1	R410	RC0402FR-07100RL	YAGEO CORP	100R	Thick film resistor, SMD 0402, 1/16W, 1%
4	R427, R428, R478, R479	RC0402FR072KL	Yageo	2k	Thick film resistor, SMD 0402, 1/16W, 1%
1	R469	CR10-2201-FK	ASJ	2.2k	Thick film resistor, SMD 0402, 1/16W, 1%
2	R803, R804	CRCW121062R0FKEAHP	vishay	62R	Thick film resistor, SMD 1210, 0.5W, 1%
2	S1, S2	BN1362	Bossard	M2.5x5 mm Pan Phillip Screw	M2.5x5 mm Pan Phillip Screw
3	SW400, SW401, SW402	TS604VM1-035CR-R	Dailywell Electronics Co.LTD	TS604VM1-035CR	SWITCH, SMD, 260gf, 6.4 mm X 6.2 mm
1	SW800	JS202011SCQN	C&K Components	JS202011SCQN	Slide Switch, C&K, 2 Pos 2 Pol, SMD
1	U200	MIC24052YJL-TR	Microchip	MIC24052YJL-TR	MCHP BUCK REGULATOR 12V 6A MIC24052 QFN-28
2	U201, U202	MIC5528-3.3YMT-T5	Microchip	MIC5528-3.3YMT	LDO 3.3V 0.5A 6TDFN
1	U203	MIC2005A-2YM5-TR	Microchip	MIC2005A-2YM5-TR	500 mA IC PWR SWICTH ACTIVE LO SOT23-5
1	U300	AT32UC3A4256HHB-C1UR	Microchip	AT32UC3A4256HHB-C1UR	AT32UC3A4256HHB-C1UR (EDBG BL installed)
1	U400	MCP6001UT-I/OT	Microchip	MCP6001UT-I/OT	Single Op Amplifier, 1 MHz, Low power, SOT-23-5
1	U401	ATSAME54P20A-AF-SL3	Microchip	ATSAME54P20A	Atmel 32-bit RISC MCU 128 TQFP_14X14
1	U700	SST26VF064BA-104I/SM	Microchip Technology Inc	SST26VF064B-104ISM	2.5V/3.0V 64 Mbit Serial Quad I/O (SQI) Flash Memory
1	U701	AT24MAC402-MAHM-T	Microchip	AT24MAC402-MAHM-T	2kbit I2C EEPROM, single EUI-48 MAC, 1.7-5.5V, 2x3 mm UDFN (8MA2)
1	U702	ATECC608B-MAHA6-S	Microchip	ATECC608B-MAHA6-S	ATECC608B-MAHA6-S TrustFLEX I2C 8UDFN Internal Order code only
1	U800	ATA6561-GBQW	Microchip	ATA6561-GBQW	5 Mbit/s CAN Trasceiver, VCC = 5V, VIO = 2.8-5V, 3x3 mm VDFN8
1	U900	MCP9808T-E/MC	Microchip Technology Inc	MCP9808	±0.5°C Maximum Accuracy Digital Temperature Sensor, I ² C/SMBus
2	VR200, VR300	V5.5MLA0603LNR	Littelfuse	V5.5MLA0603LNR	VARISTOR 8.2V 30A 0603
1	XC300	FQ5032B-12.000	Fox Electronics	12.00MHz	Fox FQ5032B 12.0000 MHz 20 pF SMD crystal 738B-12
1	Y400	DSC6011J12B-032K768T	Microchip	DSC6011J12B 32.768 kHz	MEMS OSC LVCMOS 25PPM 2.5X2.0MM
1	Y401	DSC6003J12B-012.0000T	Microchip		MEMS OSC 12 MHz Rev B (2.5x2.0 mm)
1	Y800	DSC1001CI2-050.0000T	Microchip	MEMS OSC 50 MHz 2520 package	MEMS OSC 50 MHz (2.5x2.0 mm)

3. Revision History

3.1 Revision B - February 2025

Document	Changed “DM320210” by “EV66Z56A”.
Introduction	Updated figure.
SAM E54 Curiosity Ultra Development Board Functionality and Features	Updated Figure 1-1 . Removed (Not Populated) of ATECC508 in Table 1-1 .
Schematics	Updated all the figures of this section.
Bill of Materials	Updated Table 2-1 .

3.2 Revision A - August 2019

This is the initial release of this document.

Microchip Information

Trademarks

The “Microchip” name and logo, the “M” logo, and other names, logos, and brands are registered and unregistered trademarks of Microchip Technology Incorporated or its affiliates and/or subsidiaries in the United States and/or other countries (“Microchip Trademarks”). Information regarding Microchip Trademarks can be found at <https://www.microchip.com/en-us/about/legal-information/microchip-trademarks>.

ISBN: 979-8-3371-0640-3

Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at www.microchip.com/en-us/support/design-help/client-support-services.

THIS INFORMATION IS PROVIDED BY MICROCHIP “AS IS”. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP’S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip products are strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is “unbreakable”. Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.