UM12406

FRDM-A-S32K344 development board user manual

Rev. 2.0 — 27 February 2026 **User manual**

Document information

Information	Content
Keywords	FRDM-A-S32K344, S32K3, S32K344, S32K3 Family, FRDM, Tlaloc, Hardware User Manual, Cost Effective, Development Board, MCU
Abstract	The NXP FRDM-A-S32K344 is a versatile development board designed for safety-critical and automotive applications. It integrates dual lockstep cores operating at 160 MHz, ASIL D safety hardware, an HSE security engine, and OTA support, enabling advanced data analysis, diagnostics, motor control, and rapid prototyping. The platform includes the NXP FS26 power management IC, USB Power Delivery via the PTN5110 PHY, and multiple debug interfaces such as OpenSDA and JTAG. Enhance connectivity, reliability and usability with Ethernet, CAN FD, LIN communication, onboard sensors, QSPI memory, and user-friendly peripherals.

1 Overview

The NXP FRDM-A-S32K344 features dual cores configured in lockstep mode running at 160 MHz, ASIL D safety hardware, HSE security engine, OTA support, advanced connectivity, FPU, and low power, making it ideal for advanced data analysis, diagnostics, motor control, and rapid prototyping.

The board includes the NXP SBC FS26, which provides +5.0 V and +3.3 V power rails, making this ideal for safety-critical applications. The FRDM-A-S32K344 integrate the NXP PTN5110 USB Power Delivery (PD) PHY, enabling high-voltage, high-current power and data through a single USB Type-C® port.

Equipped with an integrated OpenSDA debug with the onboard K26 MCU and the USB Type-C port, the FRDM-A-S32K344 supports multiple debug interfaces, including a 20-pin JTAG connector for external tools and convenient connectivity.

Additional user-friendly features include two push buttons, a potentiometer, an RGB LED, a 64 MB QSPI memory, and easy access to selected MCU I/O pins for prototyping.

The inclusion of Ethernet 100BASE/T with the RJ45 connector, the CAN FD (5 Mbit/s) and LIN (2.1/SAE J2602) physical layers, powered by the TJA1043 and TJA1022 transceivers, ensures reliable communication for automotive and industrial applications.

The automotive-grade sensor that are on board, NXP automotive accelerometer FXLS8964 and the NXP automotive temp sensor P3T1750, will provide real-time environmental feedback.

Overall, the FRDM-A-S32K344 provides a robust platform for developing and prototyping a wide variety of embedded systems.

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2 Block diagram

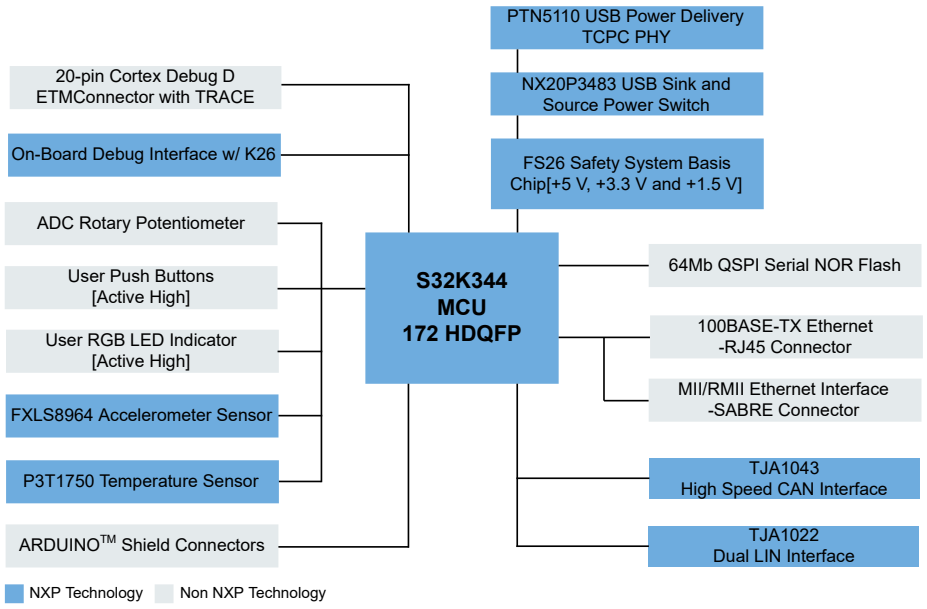


Figure 1. FRDM-A-S32K344 - Block diagram

3 Features

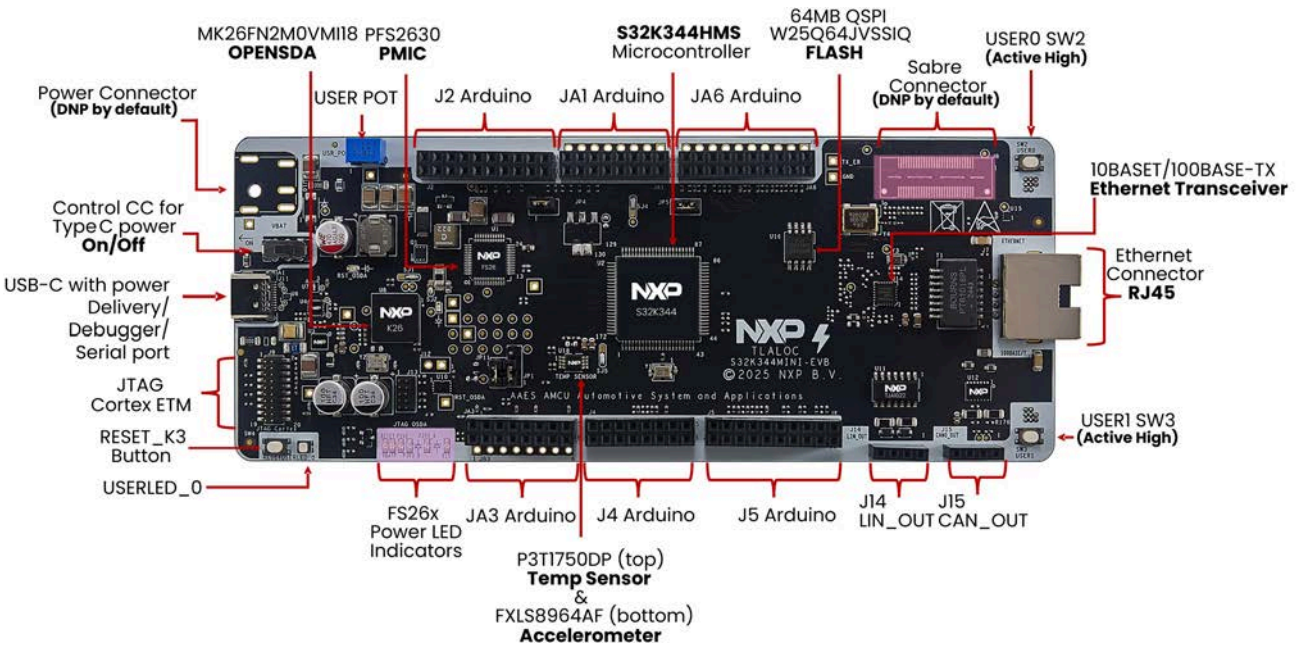


Figure 2. FRDM-A-S32K344 - Features

4 Default configuration

Table 1. FRDM-A-S32K344 - Default configuration

Interface	FRDM-A-S32K344	Reference / Signal	Default configuration	Description / Comment
MCU	•	U2	S32K344 MCU	S32K344 ASIL D dual core Arm® Cortex®-M7, 160 MHz, 4 MB Flash, CAN FD, Ethernet, HSE B security, 172 HDQFP.
Supply Peripheral Jumpers	•	JP4	1 - 2	Selects the peripherals input supply.
	•	JP5	1 - 2	
MCU Power Supply	•	VDD_HV_A	+3.3 V	The reference voltage of +3.3 V is supplied by the FS26 LDO1 regulator and routed to the VDD_HV_A power domain of the S32K344.
	•	VDD_HV_B	+3.3 V	The reference voltage of +3.3 V is supplied by the FS26 LDO2 regulator and routed to the VDD_HV_B power domain of the S32K344.
	•	V15	+1.5 V	The reference voltage of +1.5 V is supplied by the FS26 VCORE regulator and routed to the V15 core power domain of the S32K344. *(Optionally, the V15 rail can be powered through an external transistor controlled by the S32K344. To enable this configuration, transistor Q5 and circuitry must be populated and solder jumper SJ4 must be properly routed).*
	•	V11	+1.1 V	Core logic supply internally generated.

Table 1. FRDM-A-S32K344 - Default configuration...*continued*

Interface	FRDM-A-S32K344	Reference / Signal	Default configuration	Description / Comment
On-board Debug Open SDA	●	J11	Enabled	The USB-C connector is configured by default as the primary interface for debugging.
	●	JP11	1 - 2	JP11 is routed as default enabling the OpenSDA voltage.
	●	PTA15 – LPUART6_RX	Enabled	For PC serial communication.
		PTA16 – LPUART6_ TX	Enabled	
JTAG	●	J9	Disabled	The JTAG interface of the S32K344 microcontroller is accessible via a 20-pin Cortex Debug + ETM connector. To enable this interface, jumper JP11 (OpenSDA voltage) must be removed.
USB-C Power Delivery	●	J11	Enabled	By default, the USB-C connector is configured as the primary interface for USB Power Delivery. The included cable (or any USB-C cable that supports Power Delivery) can be used to power the board.
	●	SW5	1 - 2	If the power source connected to the board supports USB-C communication, switch SW5 will automatically turn the board on or off based on the connection or disconnection of the CC lines.
	●	VBUS_IN	+5.0 V	By default, the voltage on the VBUS_IN line is +5.0 V. To request a higher voltage via USB Power Delivery, a valid voltage negotiation must be initiated through the I²C interface with the PTN5110 controller. The board supports up to 20 V (with 9 V, 12 V or 15 V recommended for typical operation).
	●	PTC7 – LPI2C_SCL	Enabled	PTC7 LPI2C SCL is routed by default to the PTN5110 and NX20P3483.
		PTC6 – LPI2C_SDA	Enabled	PTC6 LPI2C SDA is routed by default to the PTN5110 and NX20P3483.
Ethernet	●	U14	Enabled	By default, the Ethernet interface is routed to the KSZ8091RNDIA 100BASE-T Ethernet PHY, which is connected to the RJ45 connector (J7).
	●	J8	Disabled	SABRE Connector is DNP by default.
Dual LIN Interface	●	J14	J14-2 LIN1	Configured by LPUART9, voltage levels are limited to VSUP voltage. (Typical 8 V when 5 V is on VBAT).
			J14-3 LIN2	Configured by LPUART5 voltage levels are limited to VSUP voltage. (Typical 8 V when 5 V is on VBAT).
CAN Interface	●	J15	J15-1 – CANH	The S32K344 is connected to a TJA1043 CAN transceiver via the CAN0_RX and CAN0_TX signal lines. Voltage levels are limited to VSUP voltage. (Typical 8 V when 5 V is on VBAT).
			J15-2 – CANL	
User RGB LED	●	D16	PTA29	Red [Active High]
			PTA30	Green [Active High]
			PTA31	Blue [Active High]

Table 1. FRDM-A-S32K344 - Default configuration...*continued*

Interface	FRDM-A-S32K344	Reference / Signal	Default configuration	Description / Comment
User Push Button	•	SW3	PTB19	With WKUP38
	•	SW2	PTB26	With WKUP41
	•	SW3	DNP PTC18	With WKUP36
ADC Potentiometer	•	R370	PTA9	With ADC0_P7
	•	R370	DNP PTC23	With ADC2_S23
QSPI Memory	•	U16	Enabled	WINBOND W25Q64J, 64 M-bit Serial Flash Memory with uniform 4 KB sectors and Dual/Quad SPI, Automotive grade.
Acceleration Sensor	•	FXLS8964AF	Enabled	±2 g/±4 g/±8 g/±16 g, Low-Power 12-Bit Digital Accelerometer. With ultra-low power wake up on motion. AEC-Q100. PTC7, PTC6 I^2C lines are routed by default.
Temperature Sensor	•	P3T1750	Enabled	Temperature-to-digital 12-Bit converter from -40 °C to +125 °C range. 1 °C accuracy, digital temperature sensor. AEC-Q900. PTC7, PTC6 I^2C lines are routed by default.
ARDUINO Headers	•	-	-	This board incorporates compatibility with ARDUINO UNO, DEVKIT-MOTORGD and DEVKIT-COMM boards. Consult the schematic for more details in the routed pins.

5 Power supply

5.1 Supply options

The FRDM-A-S32K344 is a rapid prototyping board based on the S32K344EVB-Q172. As it is not intended for final production use, the board includes a primary power supply option via USB Power Delivery, connected to the FS26 SBC. Details of this configuration are provided in Table 2.

Table 2. VBAT Supply

Mode	Max voltage / Current supported	Description
Power Delivery with USB-C Connector	Typical Input: **+5 V / 3 A** Maximum Supported: Up to **+20 V / 3 A** ***Note:*** *Actual current depends on the capabilities of the connected USB-C power source.*	By default, the FRDM-A-S32K344 is powered via the J11 USB-C connector. It is recommended to use the USB-C cable included in the box, or any cable that supports USB Power Delivery (PD), to ensure full functionality of the board. Using a non-compliant cable may result in limited current supply and reduced performance. To power the board properly, a USB-C PD compatible power source is required, such as a USB-C PD charger or a laptop with PD support. While most modern laptops support USB PD, please verify your device's capabilities before use. The FRDM-A-S32K344 supports input voltages up to 20 V. However, based on FS26 SBC recommendations, it is ideal to operate within 9 V, 12 V, or 15 V ranges with at least 1 A. Achieving these voltages and current requires proper negotiation between the USB PD source and the PD PHY (PTN5110). For guidance on implementing this negotiation with the S32K344, consult your local NXP FAE or the code available in NXP Application Code Hub web site. The FS26 manages power regulation by converting the VBAT input into stable voltage rails required by the S32K344's power domains.

Table 2. VBAT Supply*...continued*

Mode	Max voltage / Current supported	Description
		Note: *If a USB-A to USB-C cable is used to power the board, the integrated switch will not power off the board due to the lack of the cable control lines for power delivery. Always use the cable provided.*
Normal operation with barrel connector	**+12 V / 2 A**	The second power supply method for the FRDM-A-S32K344 involves connecting an external +12 V/ 2 A power source to the barrel jack connector (J10). This option is disabled by default and requires manual soldering of the following components to enable it: **J10** – Barrel connector **C1, C9** – Input capacitors **D1** – Protection diode Once these components are populated, the board can be powered through J10 as an alternative to USB-C Power Delivery.

Table 3. Supply Connectors

Supply connector	Reference	Description
	J11	**CONN RCP USB2.0 TYP C 24P SMD** (USB TYPE-C) USB 2.0 Receptacle Connector 24 Position Surface Mount, Right Angle; Through Hole
	J10	**2.1mm DI 5.5mm DE Barrel Connector** This connector should be used to connect the supplied wall-plug mains adapter. ***Note:*** *If a replacement or alternative adapter is used, care must be taken to ensure the 2.1mm plug uses the correct polarization as shown*

5.2 Start up sequence

Table 4. FRDM-A-S32K344 - Supply board method

Step sequence	Description	Graphical description
A)	Connect the USB-C cable to the J11 connector to power the board.	
B)	To power-on the board, change the default position of switch SW5 to the 2–3 setting.	

Table 4. FRDM-A-S32K344 - Supply board method*...continued*

Step sequence	Description	Graphical description
C)	Verify that all power indicator LEDs on the board are illuminated.	

5.3 Voltage reference

Due to the presence of USB Power Delivery, multiple input voltages can be supplied to the FS26 SBC. Regardless of the input voltage, the FS26 provides regulated and stable output voltages required by the S32K344's power domains.

When the board is initially powered through the USB-C connector at +5.0 V, the FS26 activates its internal boost converter to raise the voltage to +8.0 V. This boosted voltage is necessary to ensure proper operation of the LIN and CAN transceivers, even when the board is powered with only 5 V via J11.

If the board is supplied with a voltage higher than +8.0 V, achieved through successful USB PD negotiation, the FS26 automatically bypasses the boost converter and directly uses the input voltage (VBAT). In this case, the recommended input voltages are 9 V, 12 V, or 15 V, which align with FS26 specifications and ensure optimal performance.

For voltage monitoring, the board includes several test pads that allow users to measure main voltage rails. These are listed in Table 5.

Table 5. Through hole pads for measure voltages

THP reference	Signal	Expected voltage	Description
TP122	FS26_VLDO1	+3.3 V	Output voltage from LDO1, with a maximum current limit of 400 mA.
TP123	FS26_VLDO2	+3.3 V	Output voltage from LDO2, with a maximum current limit of 400 mA.
TP119	FS26_VCORE	+1.5 V	Output voltage from VCORE.
TP120	FS26_TRK1	+5.0 V	Output voltage from voltage tracker 1, with a maximum current limit of 400 mA.
TP129	VBATP_SW	+5.0 V	When no voltage negotiation occurs via USB PD.
TP128	VSUP	+8.0 V	Output voltage from FS26 Boost.
TP125	VDD_HV_A	+3.3 V	This voltage domain powers the VDD_HV_A domain of the S32K344. It is supplied by the fixed output of LDO1 from the FS26 SBC.
TP126	VDD_HV_B	+3.3 V	This voltage domain powers the VDD_HV_B domain of the S32K344. It is supplied by the fixed output of LDO2 from the FS26 SBC.
TP17	V15	+1.5 V	This voltage domain powers the V15 domain of the S32K344. It is supplied by the fixed output of VCORE from the FS26 SBC.
TPH3	GND	-	Ground reference of the board

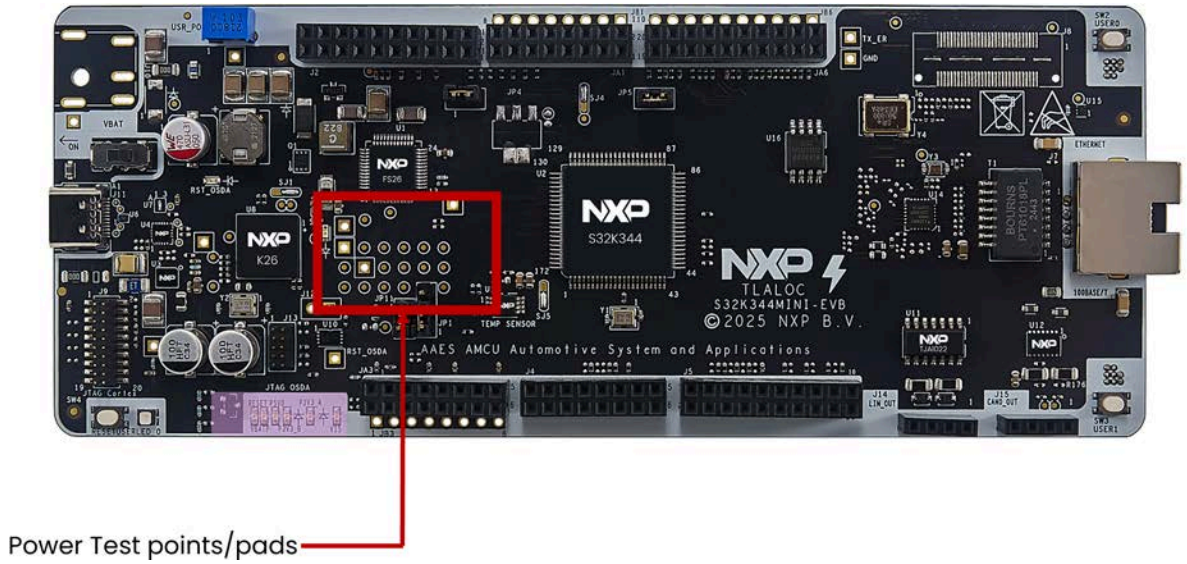


Figure 3. FRDM-A-S32K344 - Test points for power measurements

5.3.1 FS26 supply

All voltage and current regulation on the FRDM-A-S32K344 is managed by the FS26, an automotive-grade System Basis Chip (SBC) designed to support ASIL-D safety requirements in systems built around the S32K344 microcontroller.

The FS26 features multiple power supply rails and offers flexibility to work with various microcontrollers targeting automotive electrification applications. Typical use cases include powertrain, chassis control, safety systems, and low-end gateway modules.

The FS26 includes two LDO outputs, allowing the S32K344 to be powered at either 3.3 V or 5.0 V. The output voltage is configured via the SBC's OTP settings and determined by the resistor populated on the board, as shown in Figure 4.

Each LDO can supply up to 400 mA of current, which is sufficient for the connected interfaces and components on the board.

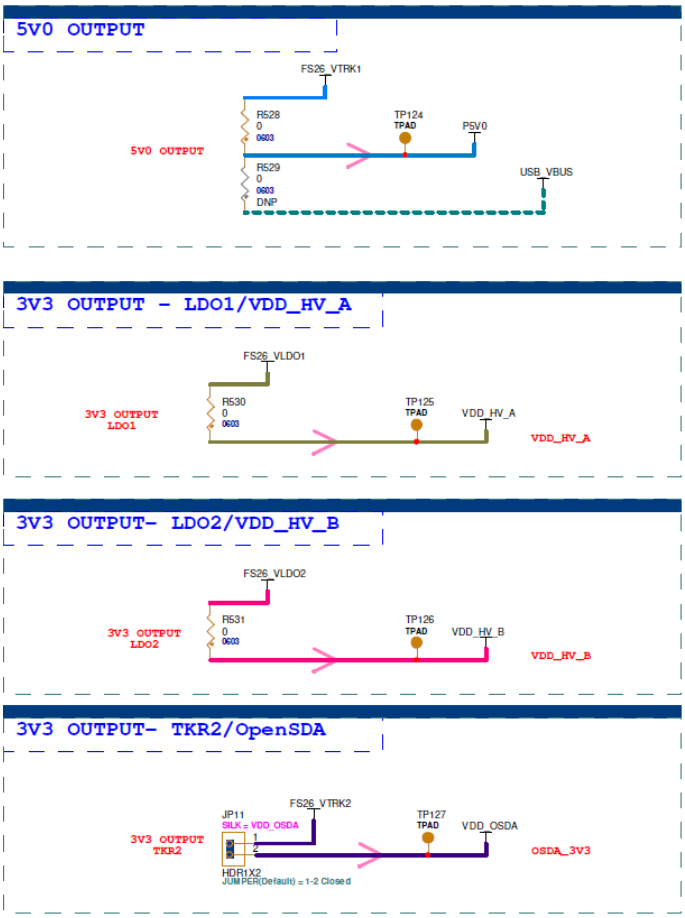


Figure 4. FRDM-A-S32K344 - Voltage selector for VDD_HV_x schematic

Communication between the S32K344 microcontroller and the FS26 is established through dedicated data lines, which are detailed in Table 6.

Table 6. Communication Signals Between S32K344 and FS26

S32K344 Pin	FS26 Pin	IO Function	Description/Comment
PTC9	MISO	LPSPI0_SIN	-
PTB1	MOSI	LPSPI0_SOUT	-
PTC8	SCLK	LPSPI0_SCK	-
PTB0	CSB	LPSPI0_PCS0	-
RESET_B	WAKE2	RESET_B	For wake-up MCU and SBC from standby to run.
PTE26	GPIO2	GPIO154	-
PTD4	AMUX	ADC0_S19	Through a 220-Ohm resistor
PTE18	INTB	GPIO146	-
PTD23	FS0B	GPIO119	-
PTD24	FS1B	GPIO120	-
PTE15	FCCU1	FCCU_ERR0	-

Table 6. Communication Signals Between S32K344 and FS26*...continued*

S32K344 Pin	FS26 Pin	IO Function	Description/Comment
PTE16	FCCU2	FCCU_ERR1	-

By default, the FS26 System Basis Chip operates in debug mode. To switch to normal operation, which enables the internal watchdog and other safety-related features, hardware modifications are required.

Specifically, resistor R43 is populated by default to keep the FS26 in debug mode. To enable normal mode, R43 must be removed and R42 must be populated instead.

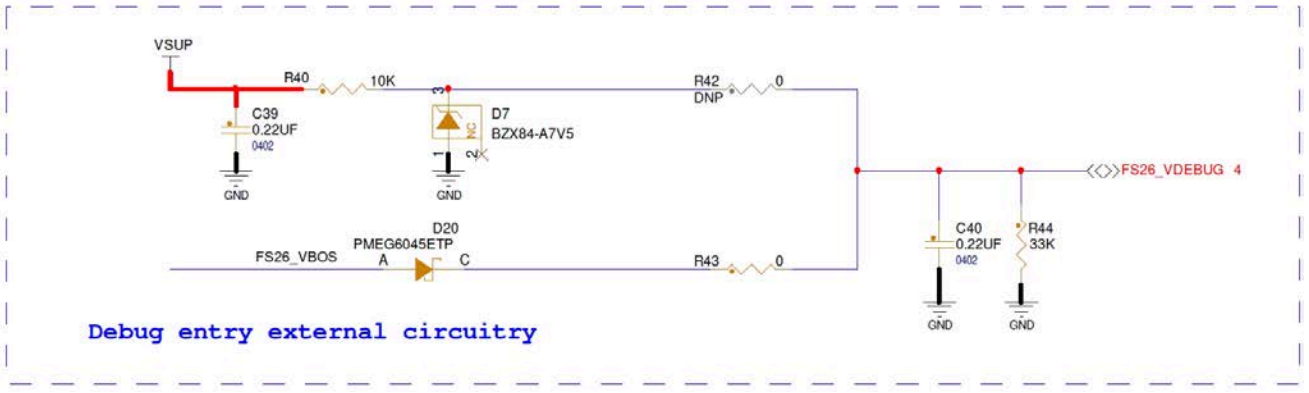


Figure 5. FRDM-A-S32K344 - FS26 mode operation schematic

5.3.2 VDD_HV_A

This voltage domain supplies the main I/O and analog power rail (VDD_HV_A) of the S32K344 microcontroller. In this configuration, the MCU is powered by the 3.3V output from LDO1 of the FS26 System Basis Chip.

As a best practice, each voltage pin on the MCU should be paired with a dedicated decoupling capacitor. All decoupling capacitors must be connected to the same voltage reference and placed as close as possible to their corresponding voltage pins to minimize noise and ensure stable operation. Recommended capacitance values are provided in the S32K3 Hardware Design Guidelines.

In addition to decoupling capacitors, a bulk capacitor is recommended to enhance voltage stability and improve robustness of the MCU power supply. Refer to Figure 6 for routing details.

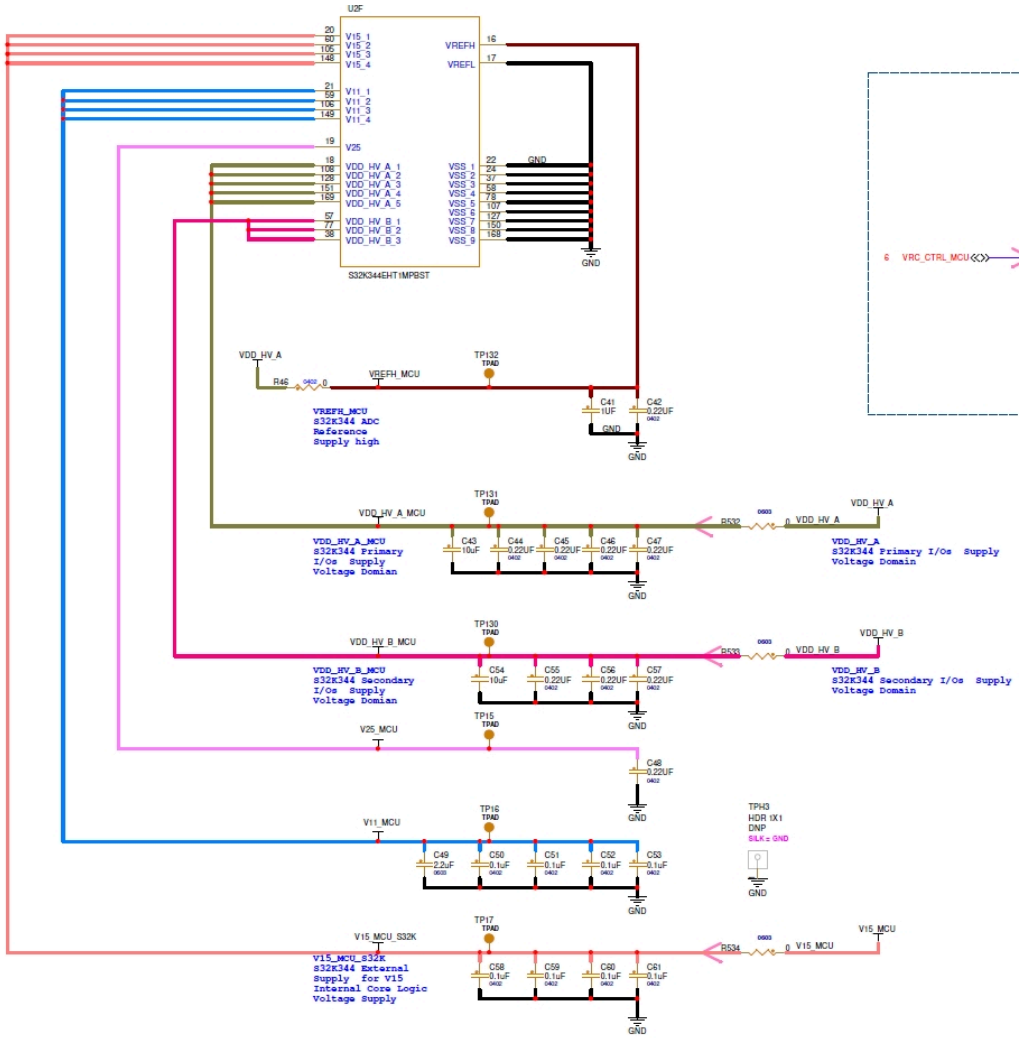


Figure 6. FRDM-A-S32K344 - Power supply schematic

5.3.3 VDD_HV_B

This voltage domain powers the fast I/O rail (VDD_HV_B) of the S32K344 microcontroller. In this configuration, the MCU receives 3.3V from the LDO2 output of the FS26 System Basis Chip.

Refer to Figure 6 for detailed routing details.

5.3.4 VREFH

The VREFH reference voltage of the S32K344 microcontroller is directly connected to the VDD_HV_A_MCU power domain.

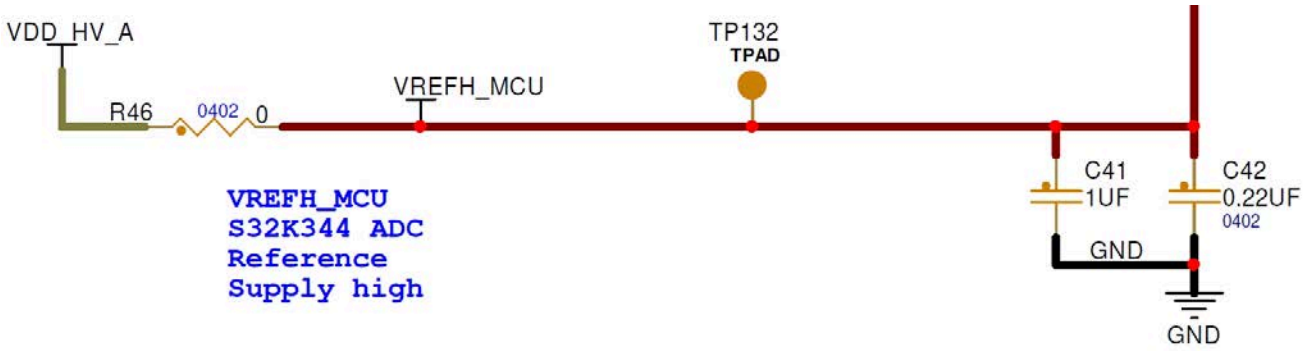


Figure 7. FRDM-A-S32K344 - VREFH power supply schematic

5.3.5 V15

The V15 reference voltage (+1.5V) is supplied by default through the FS26 VCORE output, simplifying the board's routing. However, the S32K344 microcontroller also supports generating V15 using an external NPN ballast transistor.

The FRDM-A-S32K344 provides the option to implement this external V15 generation method. Figure 8 illustrates the configuration using the V15 selector (SJ4).

To enable external V15 generation, the following components must be populated:

- Q5 – NPN ballast transistor
- C62, C63, C64 – Filtering capacitors
- R47 – Base resistor
- Solder SJ4 in 1-3 position

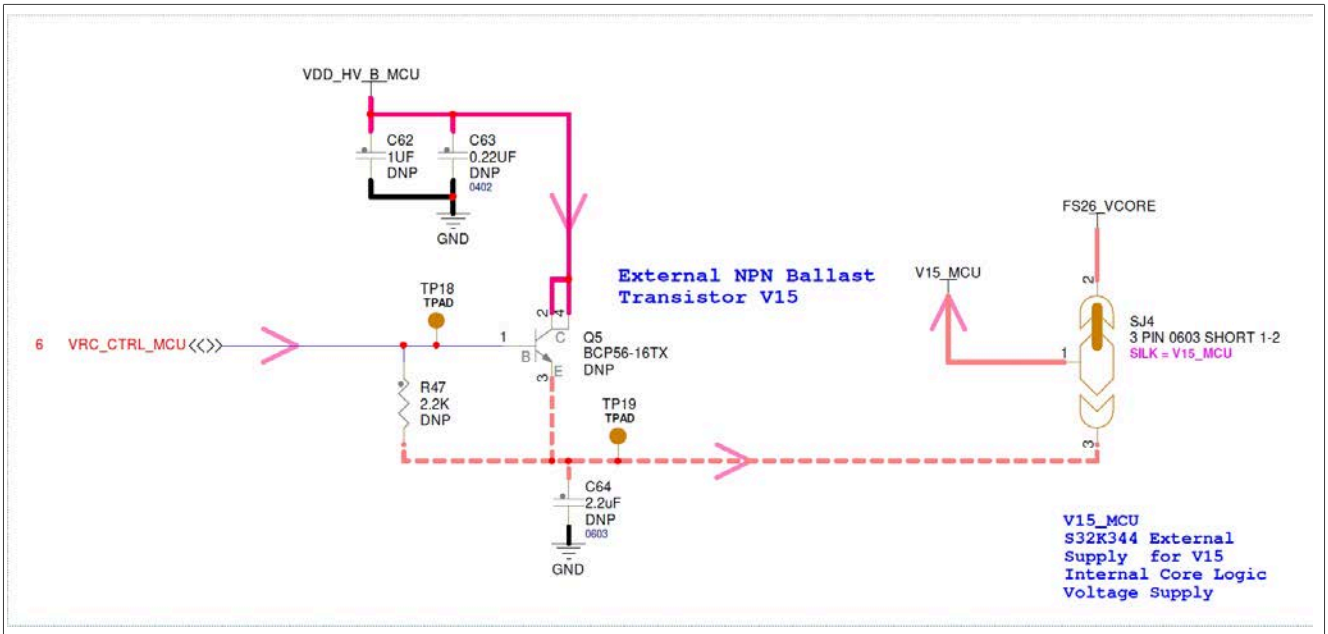


Figure 8. FRDM-A-S32K344 - V15 power supply schematic

6 Programming and Debug Interface

6.1 Reset switch and LED indicator

The reset switch (SW4) allows manual activation of the reset signal. When pressed, the S32K344 microcontroller asserts the reset line, which resets all connected peripherals on the board.

During this operation, the reset indicator LED (D17) remains illuminated, signaling that the MCU is in the reset state.

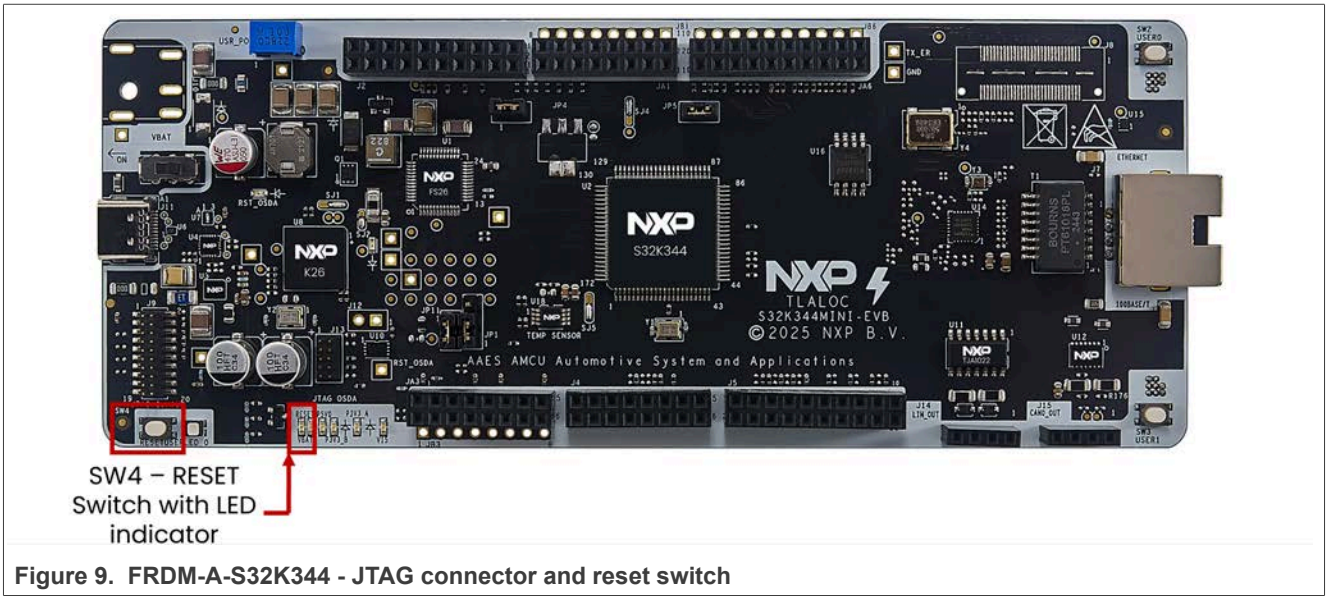


Figure 9. FRDM-A-S32K344 - JTAG connector and reset switch

6.2 Joint test action group (JTAG)

The FRDM-A-S32K344 includes JTAG connectors that allow programming and debugging of the microcontroller using a PE Micro Multilink Universal FX Debug Probe. This tool enables users to control the target's execution, read and write registers and memory, debug code directly on the processor.

In summary, the debug probe acts as a bridge between the USB host and the embedded target processor, facilitating serial and debug communication for development and testing purposes.

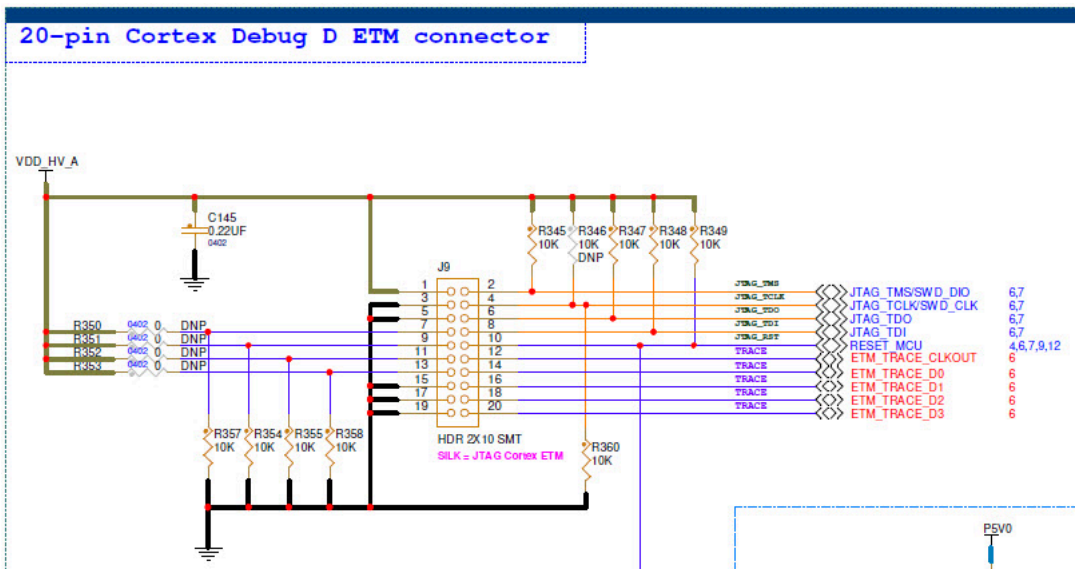


Figure 10. FRDM-A-S32K344 - JTAG schematic

Table 7. FRDM-A-S32K344 - Programming and Debug Connectors

<table>
<tr><th colspan="2">Connector</th><th>Reference / Component</th><th>Description</th></tr>
<tr><td rowspan="7">20-Pin Cortex Debug + ETM Connector</td><td rowspan="7">  </td><td rowspan="7">J9</td><td>This small 20-pin (0.05") connector provides access to SWD, SWV, JTAG, and ETM (4-bit) signals available on a Cortex-M3/M4/M7 device. A 20-pin header (Samtec FTSH-110-01) is specified with dimensions: 0.50" x 0.188" (12.70 mm x 4.78 mm).</td></tr>
<tr><td>Note: JTAG – TRACE Signals
Due to the MCU ports used on the trace signals also are shared with other interfaces, it is important to isolate these signals/interfaces for the J9-Cortex Debug D ETM connector.</td></tr>
<tr><td>
<table>
<tr><th>Signal Name</th><th>MCU Port Name</th><th>Signal Resistor</th><th>Comment</th></tr>
<tr><td>TRACE_CLK</td><td>PTC2</td><td>R63</td><td>–</td></tr>
<tr><td>TRACE_D0</td><td>PTD7</td><td>R64</td><td>Disabled as DEFAULT</td></tr>
<tr><td>TRACE_D1</td><td>PTD12</td><td>R65</td><td>Disabled as DEFAULT</td></tr>
<tr><td>TRACE_D2</td><td>PTD11</td><td>R66</td><td>Disabled as DEFAULT</td></tr>
<tr><td>TRACE_D3</td><td>PTD10</td><td>R67</td><td>Disabled as DEFAULT</td></tr>
</table>
</td></tr>
<tr><td colspan="4">All TRACE signals are DISABLED as default configuration in FRDM-A-S32K344. In order to enable the TRACE interface, the MCU signals routed to the QSPI(R69,R70,R71,R70) must be disabled and isolated, but the TRACE resistors (R64,R65,R66,R67) must be populated.</td></tr>
</table>

6.3 On board debugger

The board features an integrated on board debugger along with standard JTAG connectors. This setup enables seamless serial and debug communication between a USB host and the target embedded processor, in this case, the K26 microcontroller.

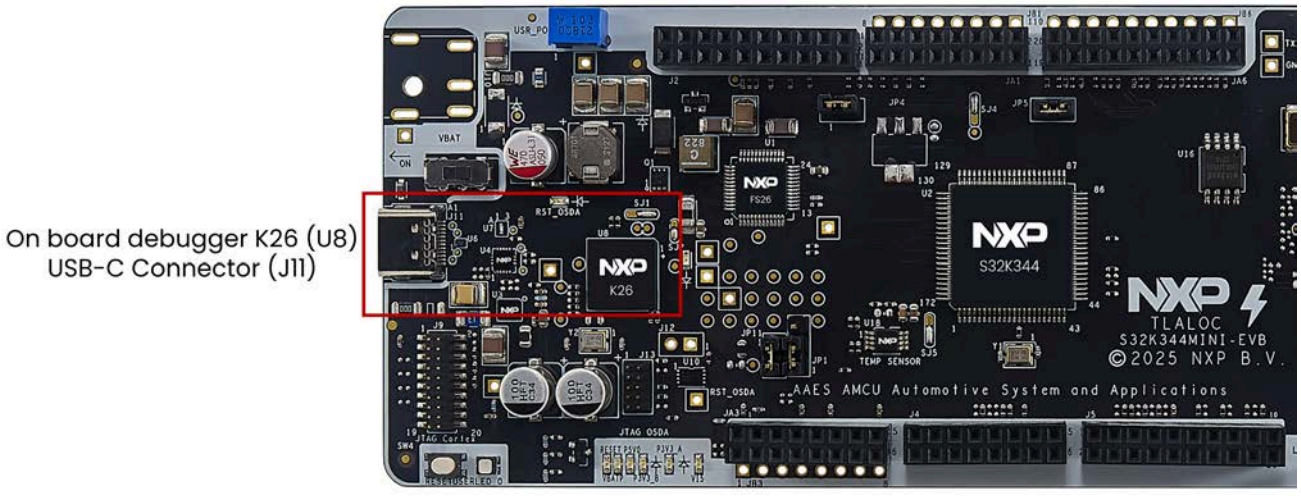
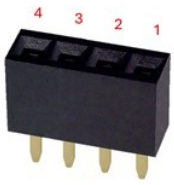


Figure 11. FRDM-A-S32K344 - On Board Debugger

7 LIN interface

The FRDM-A-S32K344 includes two LIN interfaces connected directly to the S32K344 microcontroller. These interfaces utilize NXP's TJA1022 LIN transceivers, which support master mode operation. The LIN transceiver outputs are routed to connector J14. For detailed pin assignments, please refer to Table 8.

Table 8. LIN Output Connection

Connector	Reference	Pin number	Signal
	J22	1	VBATP
		2	LIN1
		3	LIN2
		4	GND

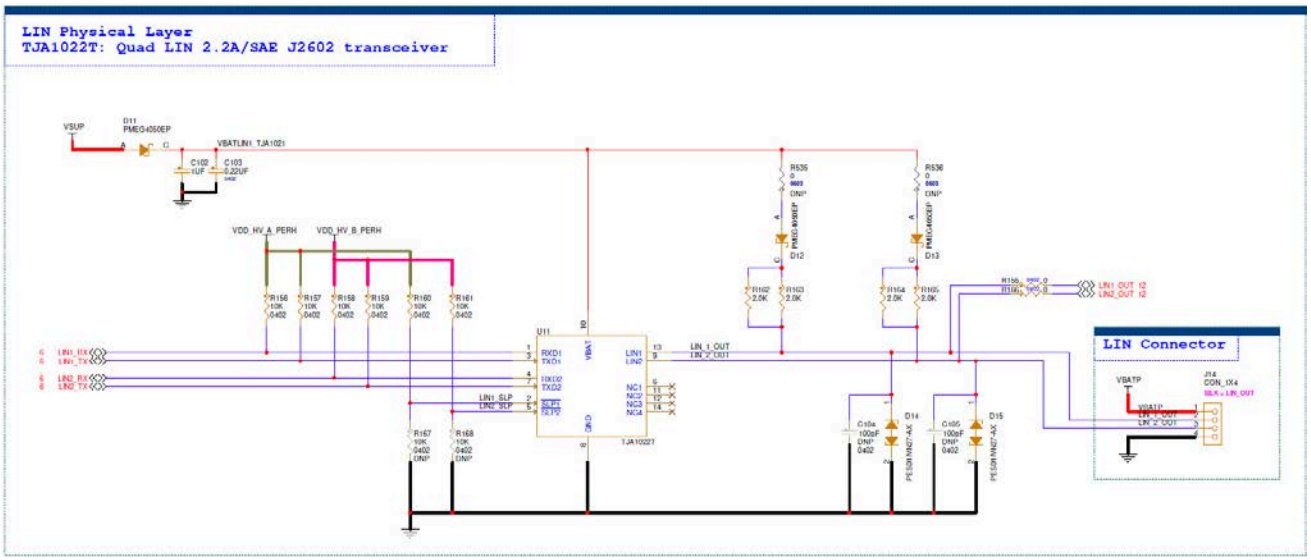


Figure 12. FRDM-A-S32K344 - LIN interface connection schematic

Note: *LIN signals are referenced to the VSUP voltage rail. By default, when using the FS26 VBOOST feature, these lines are referenced to 8V. Please exercise caution when interfacing with these signals to avoid potential voltage mismatches.*

If power delivery is enabled, it is recommended to supply 9 V, 12 V, or 15 V. In such cases, VSUP will follow the input voltage level accordingly.

Table 9. CAN Interface - MCU Signal Connections

LIN interface	Signal name	MCU port	Comments / Description
TJA1022	LIN1_RX	PTB9	LPUART9_RX is routed to LIN PHY1
	LIN1_TX	PTB10	LPUART9_TX is routed to LIN PHY1
	LIN2_RX	PTB28	LPUART5_RX is routed to LIN PHY1
	LIN2_TX	PTB27	LPUART5_TX is routed to LIN PHY1

8 CAN interface

This board integrates NXP's TJA1043 CAN transceiver, with its output routed to connector J15. For detailed pin configuration, please refer to Table 10.

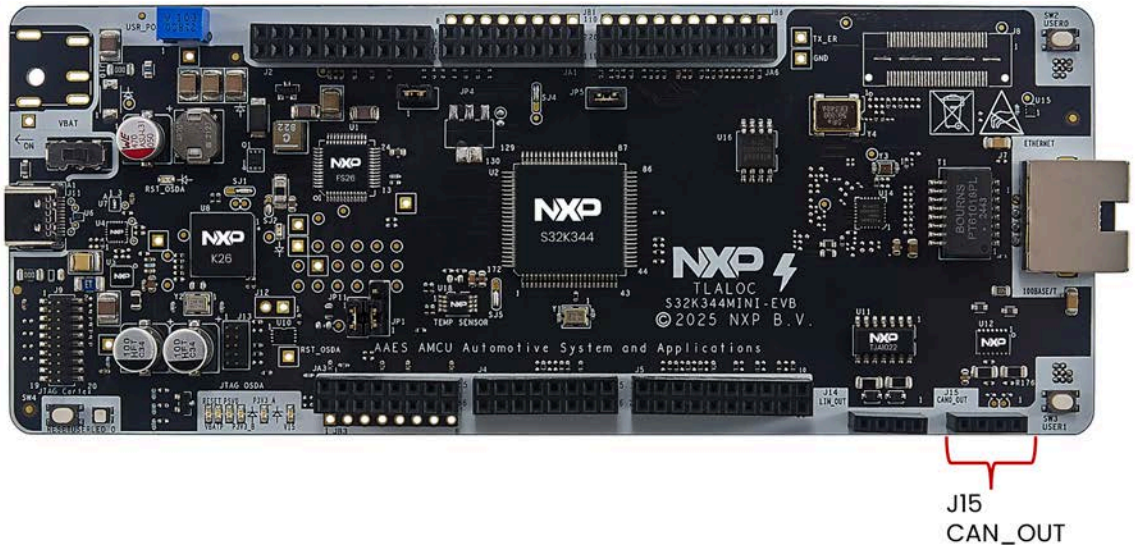
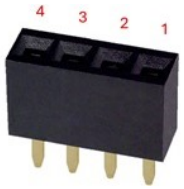


Figure 13. FRDM-A-S32K344 - CAN connector

Table 10. CAN Output Connection

Connector	Reference	Circuit/Interface	Pin Number	Signal
	J15	CAN0	1	CANH
			2	CANL
			3	GND
			4	NC

Note: *CAN signals are referenced to the VSUP voltage rail. By default, when using the FS26 VBOOST feature, these lines are referenced to 8V. Please exercise caution when interfacing with these signals to avoid potential voltage mismatches.*

If power delivery is enabled, it is recommended to supply 9 V, 12 V, or 15 V. In such cases, VSUP will follow the input voltage level accordingly.

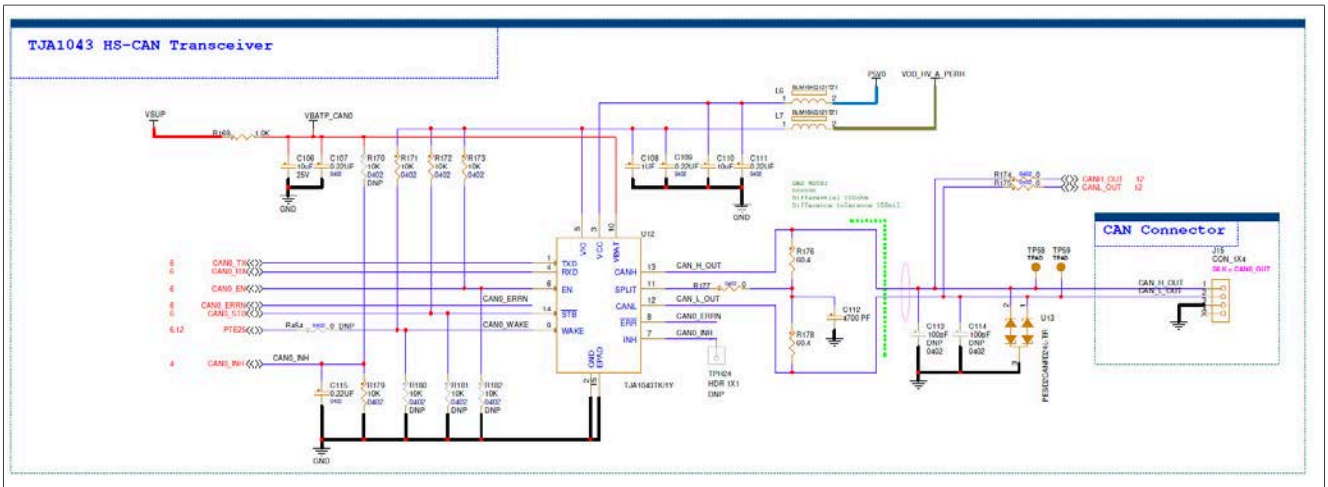


Figure 14. FRDM-A-S32K344 - CAN physical layer - TJA1043 schematic

Table 11. CAN Interface - MCU Signal Connections

LIN interface	Singal name	MCU port	Comments / Description
TJA1043	CAN0_RX	PTA6	CAN0_RX is routed to CAN PHY
	CAN0_TX	PTA7	CAN0_TX is routed to CAN PHY
	CAN0_ERRN	PTA11	PTA11 is routed to CAN PHY as CAN0_ERRN
	CAN0_EN	PTC21	PTC21 is routed to CAN PHY as CAN0_EN
	CAN0_STB	PTC20	PTC20 is routed to CAN PHY as CAN0_STB
	CAN0_INH	WAKE1 [FS26]	Not routed by default, CAN0_INH is routed to FS26 WAKE1, to enable wake-up by CAN frame.
	CAN0_WAKE	PTE25	Not routed by default, PTE25 is drive to CAN PHY as CAN0_WAKE

9 Ethernet Interface

The FRDM-A-S32K344 comes equipped with the KSZ8091, a single-supply 10BASE-T/100BASE-TX Ethernet PHY transceiver, connected to the EMAC interface of the S32K344 MCU, enabling reliable high-speed data transmission and reception via a standard RJ45 connector. This built-in Ethernet capability accelerates development and streamlines communication setup, making it ideal for rapid prototyping and evaluation in connected automotive and industrial applications.

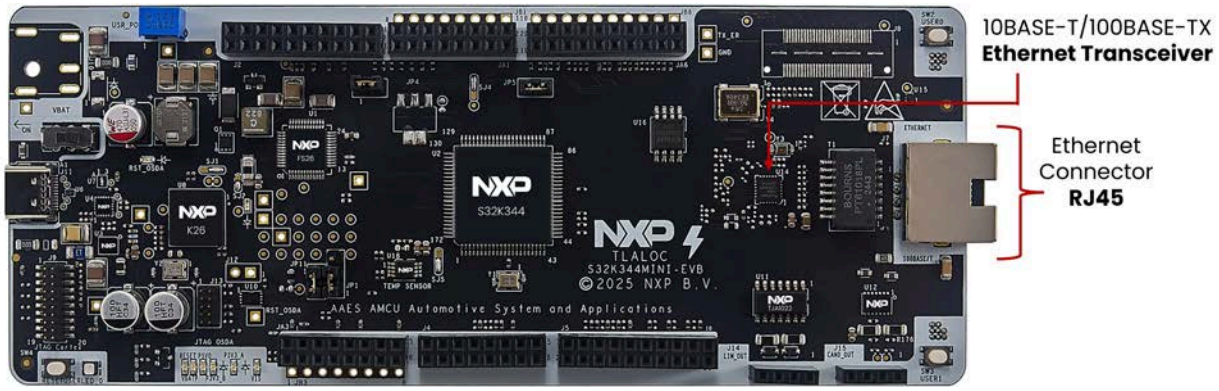


Figure 15. FRDM-A-S32K344 - Ethernet RJ45 connector

Table 12. Ethernet - MCU Signal Connections

Ethernet interface – KSZ8091	Singal name	MCU port	Comment / Description
KSZ8091 RNDIA-TRU14	MII_RMII_MDC	PTD16	MDC
	MII_RMII_MDIO	PTD17	MDIO
	MII_RMII_TXD[0]	PTB5	TXD[0]
	MII_RMII_TXD[1]	PTB4	TXD[1]
	MII_RMII_TX_EN	PTE9	TX_EN
	MII_RMII_TX_CLK	PTC0	TX_CLK
	MII_RMII_RXD[0]	PTD9	RXD[0]

Table 12. Ethernet - MCU Signal Connections*...continued*

Ethernet interface – KSZ8091	Singal name	MCU port	Comment / Description
	MII_RMII_RXD[1]	PTD8	RXD[1]
	MII_RMII_RX_DV	PTC15	DV
	MII_RMII_RX_ER	PTC16	MII/RMII receive error output
	ENET_RESET	PTE21	Ethernet reset PHY

10 DNP SABRE connector

The FRDM-A-S32K344 includes a DNP SABRE connector footprint, allowing users to easily integrate their own SABRE-compatible interface modules. This flexible design supports expansion with automotive Ethernet boards such as the TJA1120 and TJA1103, enabling rapid evaluation and customization for advanced networking applications.

To enable this feature, ensure that all components on Sheet 10 of the schematic are properly populated. Also, all S32K344 EMAC signals needs to be driven to the ENETCONN interface. This configuration routes all necessary Ethernet signals to the ENETCONN interface, enabling full Ethernet functionality.

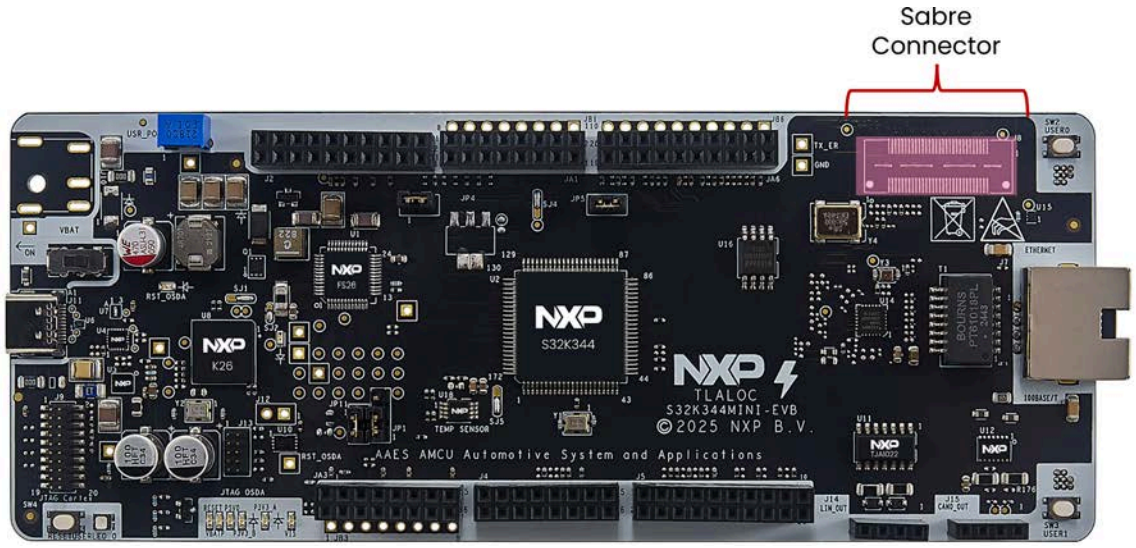


Figure 16. FRDM-A-S32K344 - SABRE connector

Table 13. DNP SABRE - MCU Signal Connections

Ethernet interface - SABRE	Signal name	MCU port	Comment / Description
J8	MII_RMII_MDC	PTD16	SMI clock input (weak pull-down)
	MII_RMII_MDIO	PTD17	SMI data I/O (weak pull-up)
	MII_RMII_TXD[0]	PTB5	MII mode: transmit data input, bit 0 of TXD[3:0] nibble (weak pull-down) RMII mode: transmit data input, bit 0 of TXD[1:0] nibble (weak pull-down)

Table 13. DNP SABRE - MCU Signal Connections*...continued*

Ethernet interface - SABRE	Signal name	MCU port	Comment / Description
	MII_RMII_TXD[1]	PTB4	MII mode: transmit data input, bit 1 of TXD[3:0] nibble (weak pull-down) RMII mode: transmit data input, bit 1 of TXD[1:0] nibble (weak pull-down)
	MII_TXD2	PTD6	MII mode: transmit data input, bit 2 of TXD[3:0] nibble (weak pull-down)
	MII_TXD3	PTD5	MII mode: transmit data input, bit 3 of TXD[3:0] nibble (weak pull-down)
	MII_RMII_ TX_EN	PTE9	MII/RMII mode: transmit enable input (active-HIGH; weak pull-down)
	MII_RMII_ TX_CLK	PTC0	MII mode: 25 MHz transmit clock output
	MII_RX_CLK	PTC1	MII mode: external 25 MHz receive clock output
	MII_RMII_ RXD[0]	PTD9	MII mode: receive data output, bit 0 of RXD[3:0] nibble RMII mode: receive data output, bit 0 of RXD[1:0] nibble
	MII_RMII_ RXD[1]	PTD8	MII mode: receive data output, bit 1 of RXD[3:0] nibble RMII mode: receive data output, bit 1 of RXD[1:0] nibble
	MII_RXD2	PTC15	MII mode: receive data output, bit 2 of RXD[3:0] nibble
	MII_RXD3	PTC14	MII mode: receive data output, bit 3 of RXD[3:0] nibble
	MII_RMII_ RX_DV	PTC17	MII receive data valid output
	MII_RMII_ RX_ER	PTC16	MII/RMII receive error output

11 QSPI interface

The FRDM-A-S32K344 integrates a WINBOND W25Q64JV 64M-bit Serial Flash memory, offering a compact and efficient storage solution for systems with limited space, pin count, and power budget. Part of the high-performance 25Q series, this device delivers enhanced flexibility and speed compared to standard Serial Flash options.

Ideal for applications such as code shadowing to RAM, eXecute In Place (XIP) via Dual/Quad SPI, and storage of voice, text, or data, the W25Q64JV empowers developers to build responsive and feature-rich embedded systems with ease.

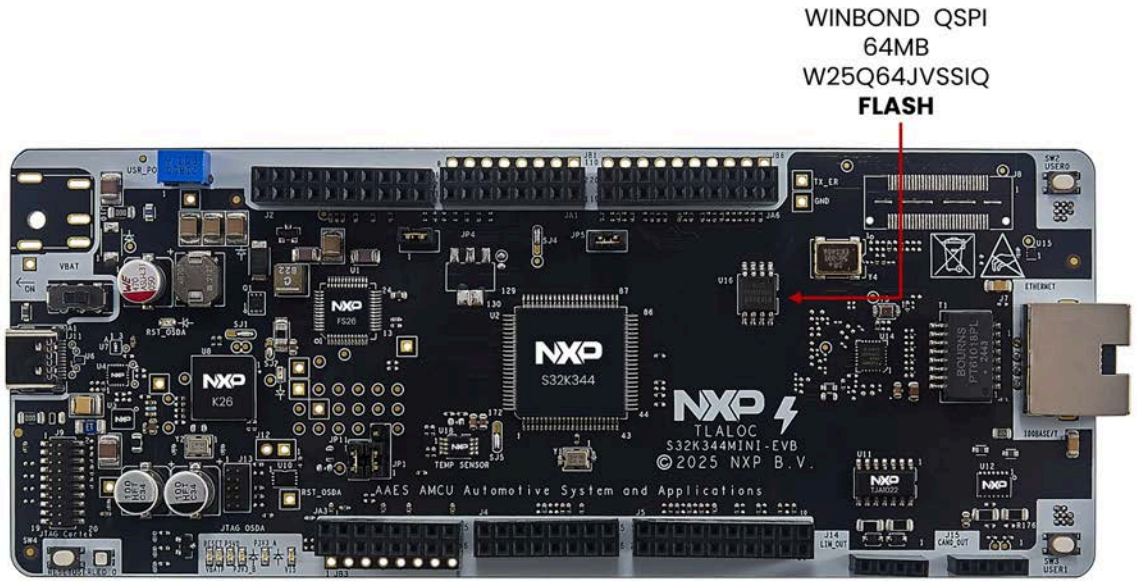


Figure 17. FRDM-A-S32K344 - WINBOND QSPI flash memory

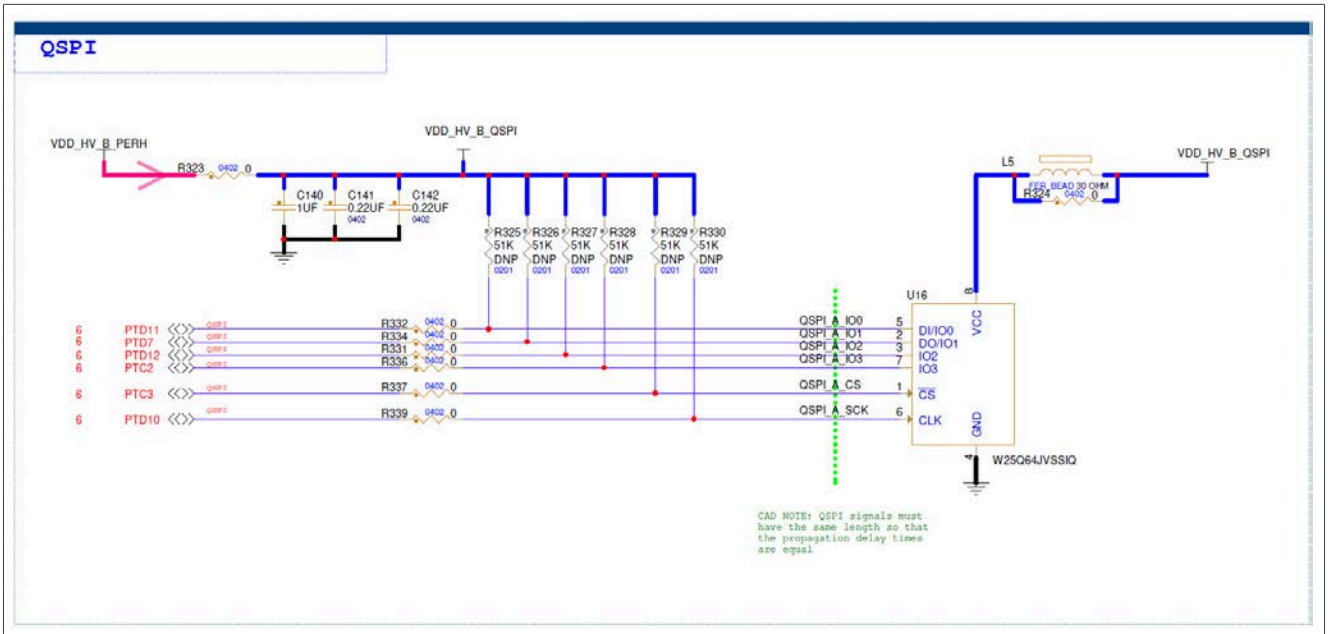


Figure 18. FRDM-A-S32K344 - QSPI memory interface schematic

Table 14. QSPI - MCU Signal Connections

Module / Function	Signal name	MCU port	Comments / Description
QSPI	QSPI_A_IO0_MCU	PTD11	-
	QSPI_A_IO1_MCU	PTD7	-
	QSPI_A_IO2_MCU	PTD12	-

Table 14. QSPI - MCU Signal Connections*...continued*

Module / Function	Signal name	MCU port	Comments / Description
	QSPI_A_IO3_MCU	PTC2	-
	QSPI_A_SCK_MCU	PTD10	-
	QSPI_A_CS_MCU	PTC3	-

12 User peripherals

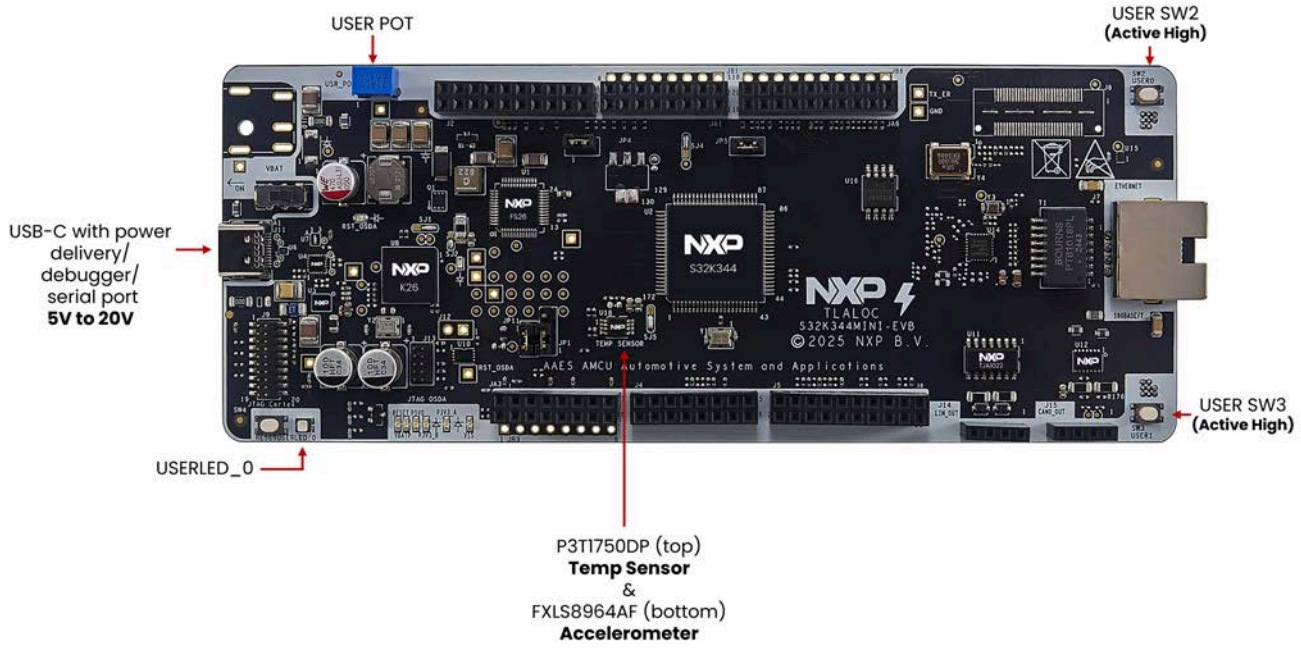


Figure 19. FRDM-A-S32K344 - User peripherals

12.1 RGB LED indicator

The board includes an active-high user-controllable RGB LED connected to dedicated MCU ports. The USER LED provide visual feedback and can be easily programmed for status indication or debugging purposes. The LED connections are mapped as follows:

Table 15. RGB LED Indicator - MCU Signal Connections

Reference	Signal name	MCU port	Comments / Description
D16	RGBLED0_RED	PTA29	RED LED Active High
	RGBLED0_GREEN	PTA30	GREEN LED Active High
	RGBLED0_BLUE	PTA31	BLUE LED Active High

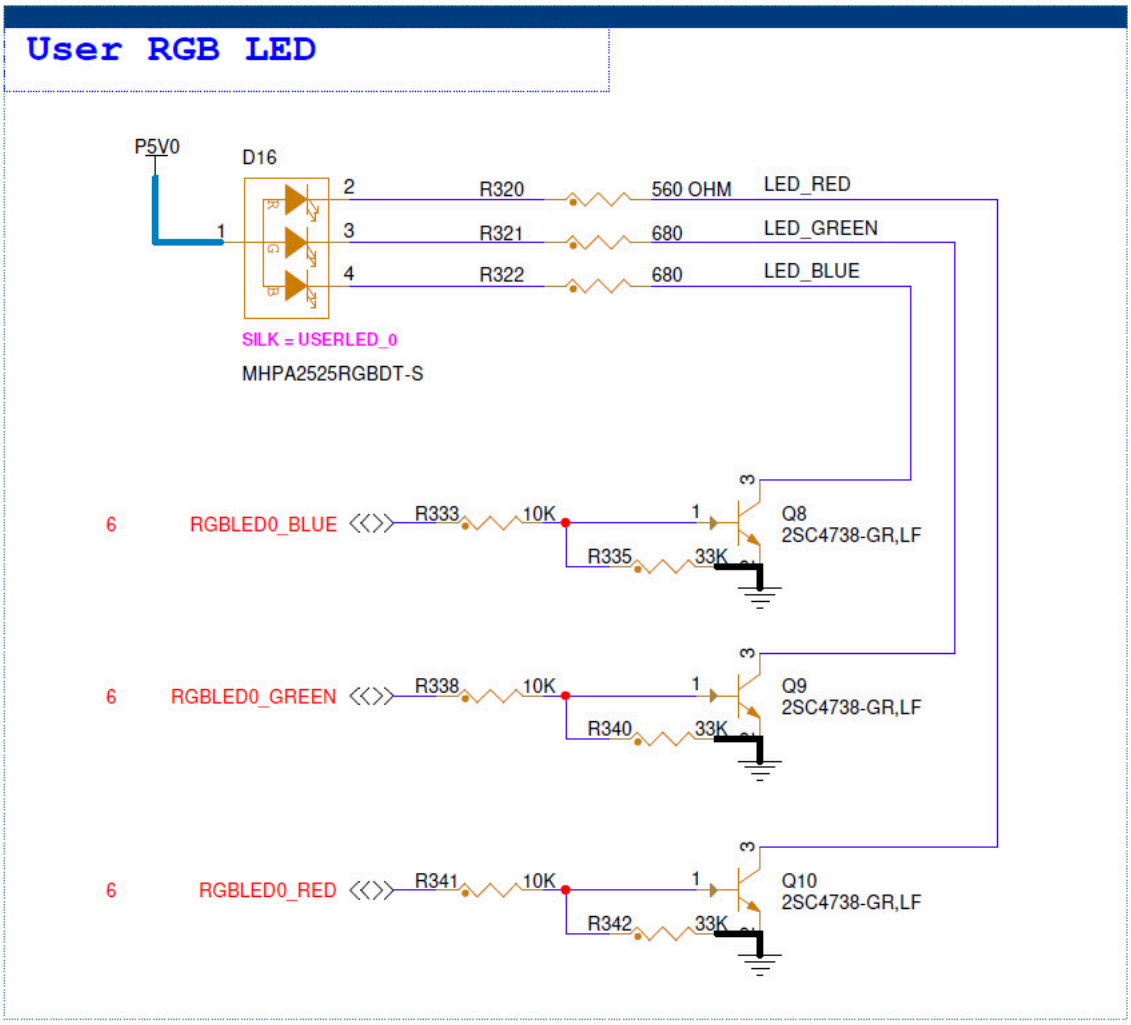


Figure 20. FRDM-A-S32K344 - User RGB LED schematic

12.2 Push buttons

The board features two active-low push-buttons (SW2 and SW3), internally pulled high and driven to the VDD_HV_B voltage rail. Push-button SW2 is connected to MCU port PTB26, while SW3 is connected to PTB19. The switch connections are outlined as follows:

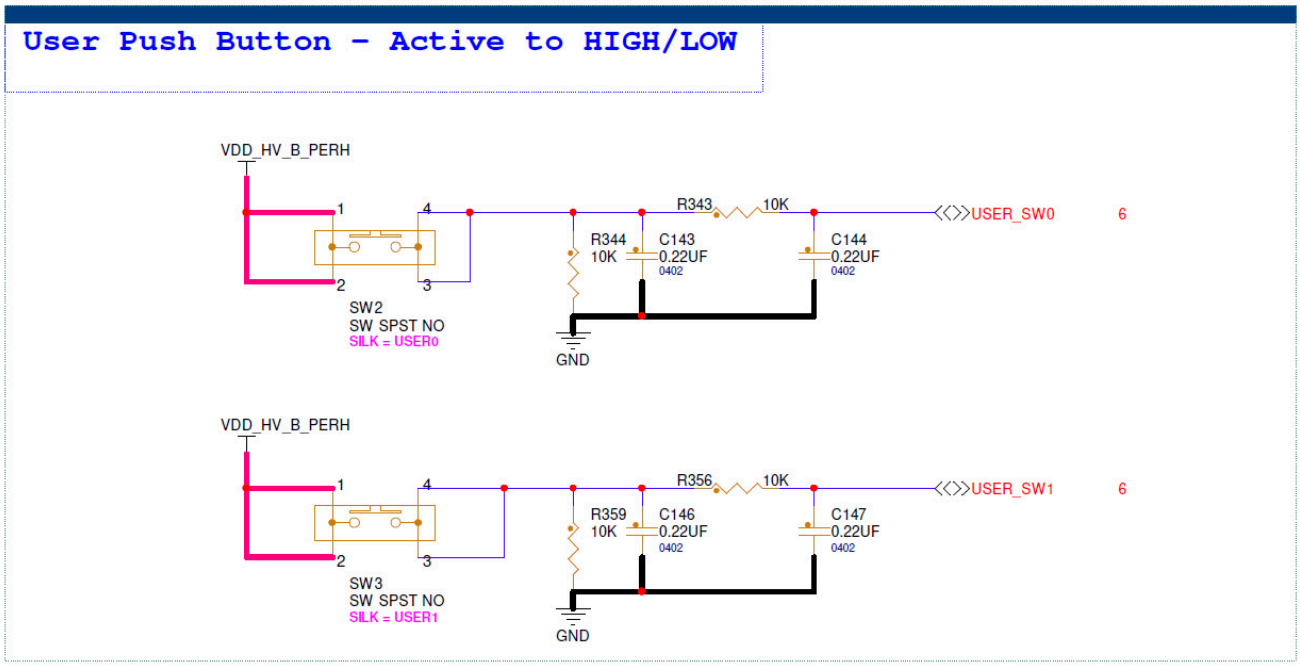


Figure 21. FRDM-A-S32K344 - User push buttons schematic

12.3 Potentiometer

The board includes a user-adjustable potentiometer connected to the MCU's ADC input PTA9 (ADC0_P7), enabling analog signal testing and calibration. Additionally, a DNP option allows rerouting the potentiometer to PTC23 (ADC2_S23) for alternative configurations. For fine-tuning, a dedicated test point (TPH6) is provided, offering convenient access during development and debugging. The potentiometer connections are detailed below:

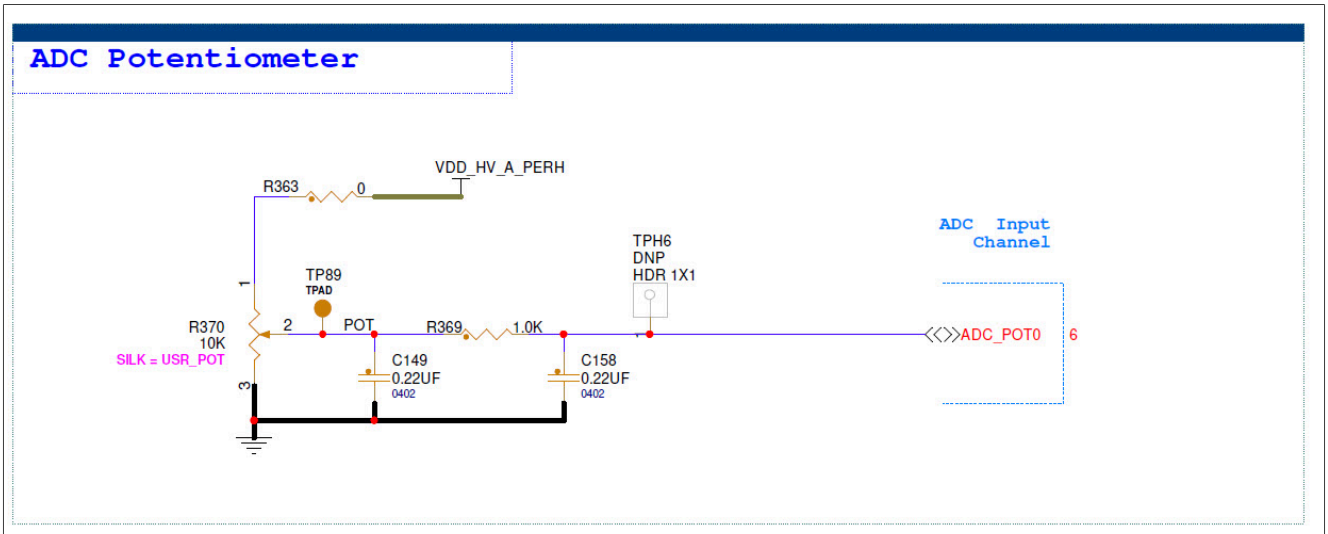


Figure 22. FRDM-A-S32K344 - User potentiometer schematic

12.4 Accelerometer sensor

The FRDM-A-S32K344 features an onboard FXLS8964 accelerometer, enabling real-time motion feedback for dynamic applications. This sensor is connected via I²C, using the default addresses: WRITE – 0x30 and READ – 0x31.

To support low-power and responsive designs, the board also connects the MOT_DET (motion detection) lines to wake-up capable pins on the S32K344 MCU. This allows developers to implement features such as standby or sleep modes that activate only when movement is detected, ideal for energy-efficient automotive and industrial systems.

The accelerometer and motion detection lines are routed as follows:

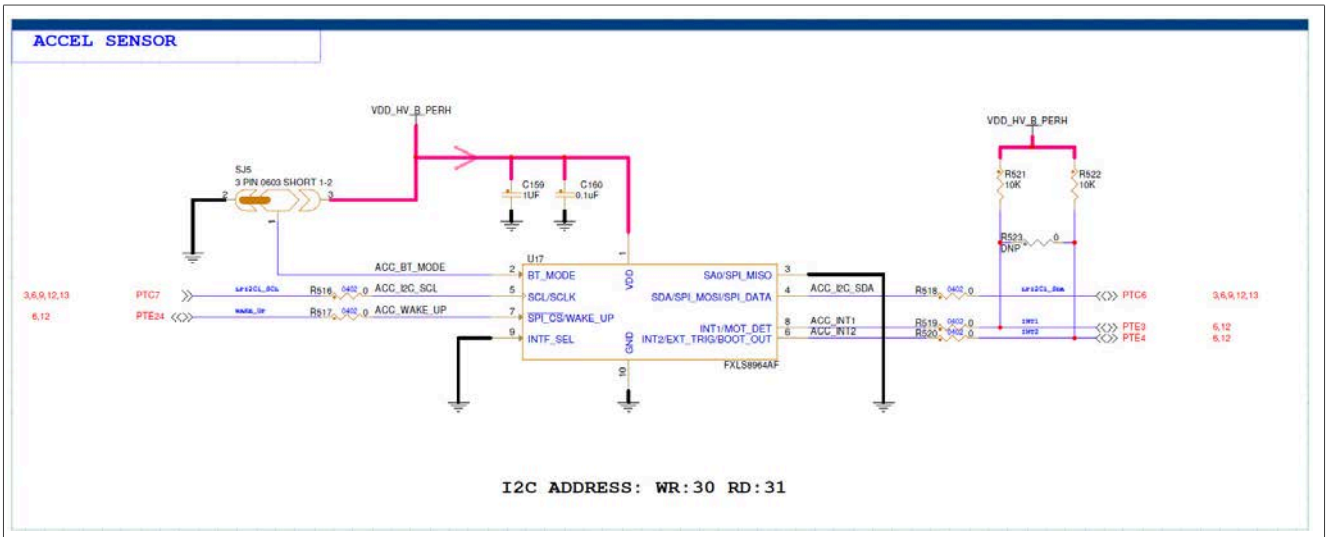


Figure 23. FRDM-A-S32K344 - Accelerometer sensor schematic

12.5 Temperature sensor

The FRDM-A-S32K344 integrates the P3T1750 temperature sensor, providing real-time ambient temperature readings close to the PCB surface. This enables developers to monitor thermal conditions during operation, which is especially valuable in automotive and industrial environments. The I²C address by default is 0x90.

The sensor's TEMP_ALERT signal is routed to an interrupt-capable pin on the S32K344 MCU, allowing applications to respond to temperature thresholds, such as initiating cooling mechanisms or entering safe modes to prevent overheating.

The temperature sensor connections are configured as follows:

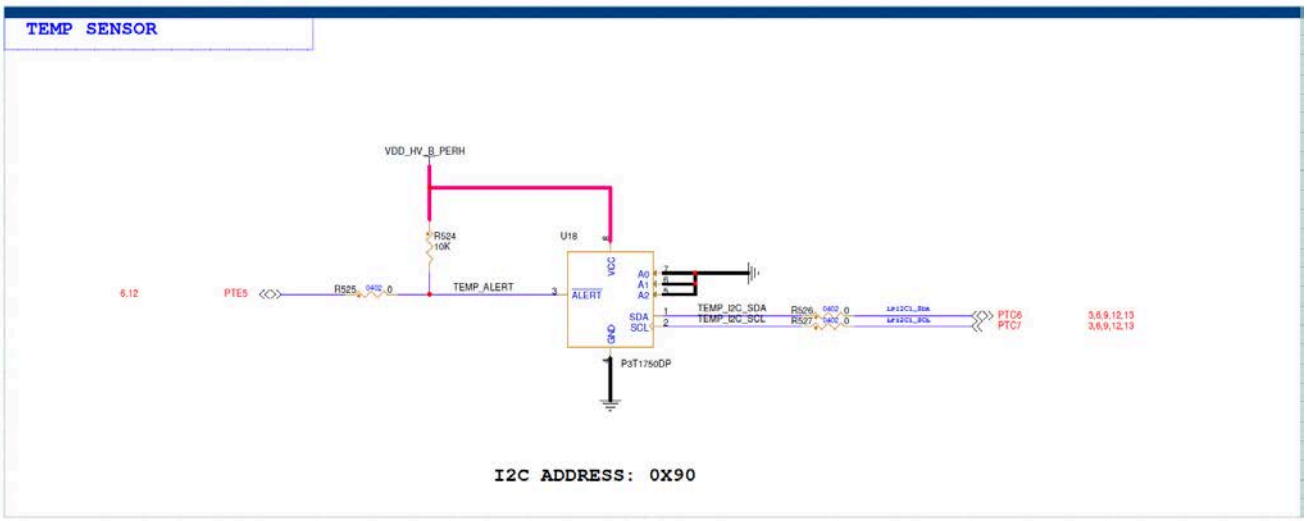


Figure 24. FRDM-A-S32K344 - Temperature sensor schematic

12.6 USB-C power delivery

The FRDM-A-S32K344 features a unique capability: Support for USB-C Power Delivery (PD), enabling flexible and intelligent power negotiation over a single USB-C port. Power Delivery is a protocol that allows devices to dynamically negotiate voltage and current levels with a PD source, optimizing power usage and enabling higher power delivery compared to traditional USB standards.

This board integrates the NXP PTN5110 USB PD PHY, which handles the communication and negotiation with the power source. It works in conjunction with the NX20P3483 MOSFET, a directional current switch that safely manages power flow to and from the board. Together, these components allow the system to request and receive specific voltage and current levels, such as 9 V, 12 V, or 15 V, based on application needs.

Combined with the FS26 and the S32K344 MCU, this configuration delivers a robust and secure power solution. It's particularly well-suited for automotive or industrial prototyping scenarios, where quick reconfiguration and reliable power delivery are essential, all through a single USB-C connection.

For S32K344 PD with the FRDM-A-S32K344 drivers consult your local FAE or the code available in NXP Application Code Hub web site.

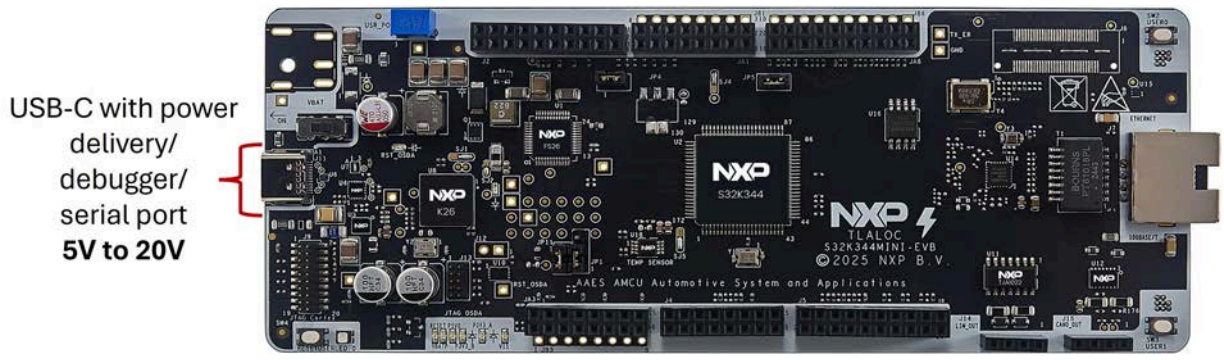


Figure 25. FRDM-A-S32K344 - power delivery

13 Pinout assignment

Despite its compact form factor and reduced Arduino header footprint compared to the S32K344EVB-Q172, the FRDM-A-S32K344 maintains inner connector compatibility with the full-sized EVB. This design allows projects developed on the FRDM-A-S32K344 board to be easily scaled to the S32K344EVB-Q172 with minimal pin reassignment, except in cases where DNP resistors are involved.

To ensure a complete development experience, the FRDM-A-S32K344 is designed to support NXP shield boards such as:

- DEVKIT-MOTORGD: A plug-in motor control solution for rapid prototyping and evaluation.
- DEVKIT-COMM: A communication expansion board offering 4 additional CAN and 6 LIN/SCI channels.

These shields can be directly plugged into the FRDM-A-S32K344 to extend its functionality for automotive and industrial applications. (Note: DEVKIT-MOTORGD and DEVKIT-COMM are sold separately and not included with the FRDM-A-S32K344.)

For detailed pinout information related to these shields, refer to Figure 26.

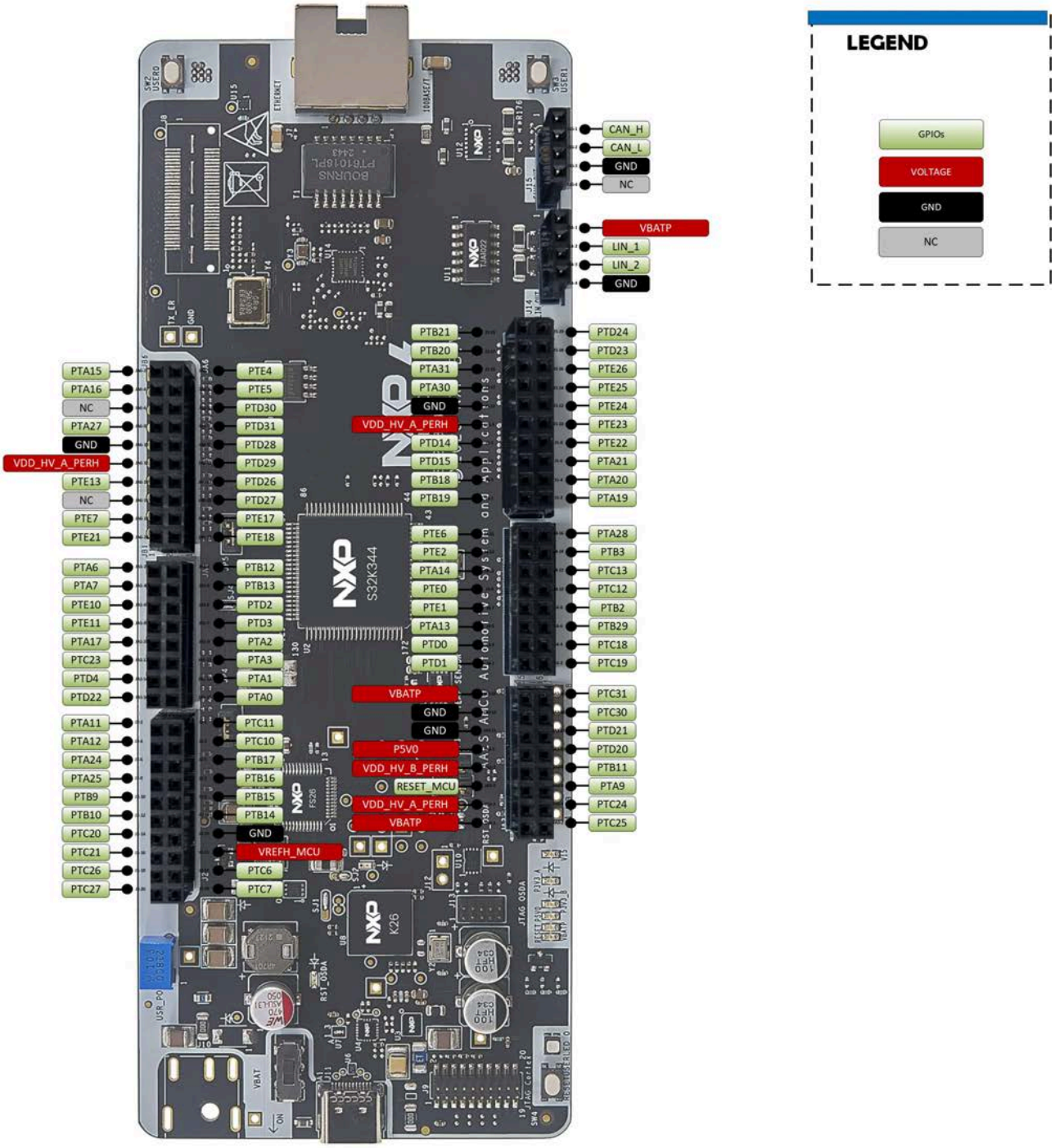


Figure 26. FRDM-A-S32K344 - ARDUINO/ DEVKIT COMM

14 Abbreviations

Table 16. Abbreviations

Abbreviation	Description
BST	Boost
CCM	Counter with CBC MAC (Cipher block chaining message authentication code)
CMOS	Complementary Metal Oxide Semiconductor
CP	Charge Pump
CPU	Central Processing Unit
CSPI	Configurable Serial Peripheral Interface
DDR	Double Data Rate
DIP	Dual In-line Package
DPGA	Differential Programmable Gain Amplifier
EEPROM	Electrically Erasable Programmable Read Only Memory
EPROM	Erasable Programmable Read Only Memory
FET	Field-effect Transistor
GCTL	Gate Control
GDU	Gate Driver Unit
GPIO	General Purpose Input/output
GPO	General Purpose Output
HG	High-side Gate
HS	High-side Source
HW	Hardware
HVI	High Voltage Input
HVM	High Voltage Module
I^2C	Inter-Integrated Circuit
I/O	Input/output
JTAG	Joint Test Access Group
LED	Light Emitting Diode
LG	Low-side Gate
LPM	Low-power Mode
LS	Low-side Source
MB	Megabyte
MCU	Microcontroller Unit
MOSFET	Metal-oxide Semiconductor Field-effect Transistor
MS	Memory Stick
NVRAM	Non-volatile Random Access Memory
PCB	Printed Circuit Board

Table 16. Abbreviations...*continued*

Abbreviation	Description
PHY	Physical interface
PMC	Power Management Controller
POR	Power-on Reset
PSRAM	Pseudo Random Access Memory
PWR	Power
PWM	Pulse Width Modulation
RAM	Random Access Memory
SDRAM	Synchronous Dynamic Random-Access Memory
TFT	Thin Film Transistor
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
PD	Power Delivery

15 Revision History

Table 17. Revision History

Document ID	Release Date	Description
UM12406 v.2.0	27 February 2026	• S32K344MINI-EVB renamed to FRDM-A-S32K344 • Replaced "MII_RMII_RX_CRS" to "MII_RMII_RX_DV" and values in Table 12 • Rephrased from "For guidance on implementing this negotiation with the S32K344, consult your local NXP FAE." to "For guidance on implementing this negotiation with the S32K344, consult your local NXP FAE or the code available in NXP Application Code Hub web site." in Power Delivery with USB-C Connector description in Table 2 • Rephrased from "For S32K344 PD with the FRDM-A-S32K344 drivers consult your local FAE." to "For S32K344 PD with the FRDM-A-S32 K344 drivers consult your local FAE or the code available in NXP Application Code Hub web site." in Section 12.6
UM12406 v.1.0	20 January 2026	Initial release

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