# UG10140 EVSE-SIG-BRD2X Board User Guide Rev. 1.0 — 1 August 2024

User guide

#### **Document information**

Information	Content
Keywords	UG10140, EVSE-SIG-BRD2X, LPC5536/LPC55S36, electric vehicle (EV), electric vehicle supply equipment (EVSE), EV simulation software, Control Pilot (CP), Proximity Pilot (PP)
Abstract	This document is a quick and easy guide to get the EVSE-SIG-BRD2X board up and running while being integrated with an NXP host platform evaluation board. The EVSE-SIG-BRD2X is an add-on development board that supports electric vehicle supply equipment (EVSE) or electric vehicle (EV) platform development.



## **1** Board overview

ISO 15118 is a globally dominant electric vehicle charging standard that can support multiple electric vehicles (EV) including motor bikes, cars, buses, trucks, boats, and others. The standard is user-friendly and supports plug and charge technology. When the EV is connected to the charger, the EV automatically identifies itself to recharge its battery. The standard supports strong data security both in transport and application layers using TLS1.2, XML-based signatures, and X.509 certificates. The EV also acts as a battery bank and supply power to the home during the down time of the local energy grid supply. It is done in a mode referred to as bidirectional power transfer (BPT).

ISO 15118 also gives provision for secure and automated billing via an e-mobility operator. The standard helps in load management in the EV for battery-optimized charging. Depending on the dynamic grid supply condition, renegotiation of the charging schedule is achievable to satisfy several EVs charging simultaneously.

NXP enables the host controller support for EV supply equipment (EVSE) from a range of microcontrollers and microprocessors, such as:

- i.MX RT106x crossover MCU
- i.MX 8M Nano applications processor
- i.MX 93 applications processor

Advanced security is provided using add-on modules with secure element (NXP SE050) and near-field communication (NFC) capability for user/EV identification using NFC front-end solutions from NXP.

The EVSE-SIG-BRD2X is an add-on development board that supports EVSE or EV platform development. The main host of the system is on a separate processor development board. For example, NXP i.MX RT106x EVK, i.MX 8M Nano EVK, or S32G-VNP-RDB3. The ISO 15118 stack and communication software run on the host processor. The power-line communication path is via the HomePlug Green PHY (HPGP) transceiver (Lumissil IS32CG5317) included on the EVSE-SIG-BRD2X. The EVSE development platform includes the host controller, EVSE-SIG-BRD2X, security and NFC modules, and NXP Kinetis KM3x family of metering microcontroller solutions. These modules form the basis of a full electric vehicle charging station for quick system design and prototyping.

This document is a quick and easy guide to get the EVSE-SIG-BRD2X up and running and integrate with an NXP host platform evaluation board. For EVSE simulation, the host platform board can be a i.MX RT106x EVK board hosting the i.MX RT Crossover MCU, i.MX 8M Nano applications processor, and i.MX 93 applications processor. For EV simulation, the host platform S32G-VNP-RDB2/3 or S32K312EVB-Q172 or a similar platform supporting Arduino Uno interface can be used.

**Note:** To get implementation details of individual sub-blocks of the board, see the EVSE-SIG-BRD2X User Manual (document UM12128).

## 1.1 Block diagram

Figure 1 shows the EVSE-SIG-BRD2X block diagram.



## **1.2 Board features**

Table 1 lists the board features of the EVSE-SIG-BRD2X board.

Table 1.	<b>EVSE-SIG-BRD2X</b>	board features

Board feature	Description
Embedded microcontroller	NXP LPC5536/LPC55S36 MCU, which features a 32-bit Arm Cortex-M33 core, 128 KB SRAM, 256 KB flash, FlexSPI with cache, USB FS, Flexcomm interface, CAN FD, 32-bit counters/timers, SCTimer/PWM, 16-bit 2.0 Msamples/s ADC, comparator, 12-bit DAC, op-amp, FlexPWM timer, QEI, temperature sensor, and CRC
Embedded HPGP	Lumissil CG5317
Embedded Ethernet switch MCU	NXP SJA1110B
<ul> <li>Host connectors</li> <li>Arduino Uno</li> <li>ECP CN/GPIO header</li> <li>Multi-function port (MFP) connector</li> </ul>	<ul> <li>Power: +5 V, +3.3 V</li> <li>One SPI port with two chip selects</li> <li>One UART port</li> <li>GPIOs</li> <li>LIN (MFP only)</li> </ul>
Ethernet host interface	<ul><li>One100BASE-TX</li><li>One 100BASE in place of 100BAST-T1 interfaces</li></ul>
CAN interface	One NXP TJA1044GT CAN PHY interface
LIN interface	One NXP TJA1021T/20/C LIN PHY interface
Debug interface	<ul> <li>Auxiliary UART interface from LPC5536/LPC55S36</li> <li>SWD debug port of LPC5536/LPC55S36 for development</li> </ul>
Control pilot	J1772 (IEC 61851) PWM, ISO 15118-2/20 EVSE, and EV support
Proximity pilot	J1772 support
GFCI	GFCI detection and relay asynchronous triggering
Relay driver	Drive up to two DC coil relays at 12 V, 140 mA
External AFE interface	Allows to connect with an external Analog-Front-End (AFE)
Safety Check header	Allows to connect with an external high voltage AC and current sensor circuit
Power	<ul> <li>Primary power supply options:</li> <li>5 V external power through DC power supply jack (J1)</li> <li>Power from the host connector (Arduino/EXP CN/MFP)</li> <li>On board, +5 V to +12 V boost converter</li> <li>On board, +12 V to -12 V charge pump inverter</li> </ul>
РСВ	6.4 inch x 3 inch, 6-layer
Orderable part number	EVSE-SIG-BRD2X

## **1.3 Board pictures**

Figure 2 shows the top-side view of the EVSE-SIG-BRD2X board.



Figure 3 shows the bottom-side view of the EVSE-SIG-BRD2X board.



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## **1.4 Connectors**

Figure 4 shows the EVSE-SIG-BRD2X connectors.



## Table 2 EVSE-SIG-BRD2X board connectors

Table 2 describes the EVSE-SIG-BRD2X connectors.

Part identifier	Connector type/default	Description
J1	DC power jack; open	External +5 V power supply jack
J6	1x3-pin header	HS CAN connector
<b>J</b> 9	3-position wire-to-board connector	Control pilot/proximity pilot connector
J15	SMA receptacle	Control pilot (test) connector
J16	2x2-position receptacle	Control pilot connector
J23	1x2-pin header	Secondary GFCI coil connector
J24	2-position wire-to-board connector	Relay coil connector
J30	2x5-pin header	LPC5536/LPC55S36 SWD debug connector
J33	9-pin (10-position) header	SJA1110B SWD debug connector
J34	2-position wire-to-board connector	100BASE-T1 Ethernet connector
J36	1x10-position receptacle	Arduino Uno connector that provides power to the GPIO signals
J37	1x8-position receptacle	Arduino Uno connector that provides power to the board
J39	1x6-position receptacle	Arduino Uno connector that provides power to the GPIO signals
J40	1x8-position receptacle	Arduino Uno connector that provides power to the GPIO signals

Part identifier	Connector type/default	Description
J44	2x20-pin header	Expansion connector that provides power to the board, GPIO signals
J45	2x13-position receptacle	MFP connector that provides power to the board, GPIO signals, LIN signals
J46	1x4-pin header; open	Auxiliary UART connector
J50	2x5 pin header	Safety check header
J52	2x4 pin header	External AFE header
JP1	1-pin header	Proximity pilot connector
P4	RJ45 jack	100BASE-TX Ethernet connector

#### Table 2. EVSE-SIG-BRD2X board connectors...continued

## 1.5 Jumpers

Table 3 shows the EVSE-SIG-BRD2X jumpers.



Table 3 describes the EVSE-SIG-BRD2X jumpers.

Table 3.	EVSE-SIG-BRD2X	board	jumpers

Part identifier	Jumper type/default	Description
J2	1x3-pin header	<ul> <li>5V_SYS power source selection jumper:</li> <li>Pins 1-2 shorted: 5V_SYS supply is produced from DC_5V_IN supply.</li> <li>Pins 2-3 shorted (default setting): 5V_SYS supply is produced from 5V_ARD_EXP_CN supply.</li> </ul>
J3	1x3-pin header	<ul> <li>3.3V_SYS power source selection jumper:</li> <li>Pins 1-2 shorted: 3.3V_SYS supply is produced from VDD_3V3 supply.</li> <li>Pins 2-3 shorted (default setting): 3.3V_SYS supply is produced from 3V3_ARD_EXP_CN supply.</li> </ul>
J4	1x2-pin header	<ul><li>12V0_ISO supply enable jumper:</li><li>Open: 12V0_ISO supply is OFF.</li><li>Shorted (default setting): 12V0_ISO supply is produced from a 12V0 supply.</li></ul>
J5	1x2-pin header	<ul> <li>-12V0_ISO supply enable jumper:</li> <li>Open: -12V0_ISO supply is OFF.</li> <li>Shorted (default setting): -12V0_ISO supply is produced from -12V0 supply.</li> </ul>
J7	1x2-pin header	EVSE/EV PWM loopback enable jumper: • Open (default setting): EVSE/EV PWM loopback is disabled. • Shorted: EVSE/EV PWM loopback is enabled.
J8	2x2-pin header	<ul> <li>Control pilot selection jumper:</li> <li>Pins 1-2 shorted (default setting): EVSE control pilot is selected for PWM generation and detection.</li> <li>Pins 3-4 shorted: EV control pilot is selected for PWM generation and detection.</li> </ul>

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Part identifier	Jumper type/default	Description
J10	1x3-pin header	<ul> <li>Proximity pilot board test points</li> <li>Pins 1-2 shorted (default setting): Proximity pilot is used for EVSE simulation.</li> <li>Pins 2-3 shorted: Proximity pilot is used for EV simulation.</li> </ul>
J11	1x2-pin header	<ul> <li>3V3_CG5317 supply enable jumper:</li> <li>Open: 3V3_CG5317 supply is OFF.</li> <li>Shorted (default setting): 3V3_CG5317 supply is produced from 3.3V_SYS supply.</li> </ul>
J12	1x2-pin header	<ul> <li>VCORE supply enable jumper:</li> <li>Open: VCORE supply is OFF.</li> <li>Shorted (default setting): VCORE supply is produced from 3V3_CG5317 supply.</li> </ul>
J13	1x2-pin header	<ul> <li>3.3VA supply enable jumper:</li> <li>Open: 3.3VA supply is OFF.</li> <li>Shorted (default setting): 3.3VA supply is produced from 3.3V_SYS supply.</li> </ul>
J17	1x3-pin header	Boot strap pin headers for CG5317 HPGP <ul> <li>Pins 1-2 connected</li> </ul>
J18		Boot strap pin headers for CG5317 HPGP <ul> <li>Pins 2-3 connected</li> </ul>
J19	-	Boot strap pin headers for CG5317 HPGP <ul> <li>Pins 1-2 connected</li> </ul>
J20	-	Boot strap pin headers for CG5317 HPGP <ul> <li>Pins 2-3 connected</li> </ul>
J21	-	Boot strap pin headers for CG5317 HPGP <ul> <li>Pins 1-2 connected</li> </ul>
J22	-	Boot strap pin headers for CG5317 HPGP <ul> <li>Pins 1-2 connected</li> </ul>
J25	1x2-pin header	<ul> <li>MCU_VDD supply enable jumper:</li> <li>Open: MCU_VDD supply is OFF.</li> <li>Shorted (default setting): MCU_VDD supply is produced from 3.3V_SYS supply.</li> </ul>
J26	1x2-pin header	<ul> <li>MCU_VDDA supply enable jumper:</li> <li>Open: MCU_VDDA supply is OFF.</li> <li>Shorted (default setting): MCU_VDDA supply is produced from 3.3V_SYS supply.</li> </ul>
J27	1x2-pin header	<ul> <li>MCU_MAIN supply enable jumper:</li> <li>Open: MCU_MAIN supply is OFF.</li> <li>Shorted (default setting): MCU_MAIN supply is produced from 3.3 V_SYS supply.</li> </ul>
J28	1x2-pin header	<ul> <li>MCU_VBAT supply enable jumper:</li> <li>Open: MCU_VBAT supply is OFF.</li> <li>Shorted (default setting): MCU_VBAT supply is produced from 3.3 V_SYS supply.</li> </ul>
J29	1x2-pin header	<ul> <li>LPC5536/LPC55S36 MCU boot mode selection jumper:</li> <li>Open: LPC5536/LPC55S36 MCU boots in In-System Programming (ISP) mode.</li> <li>Shorted (default setting): LPC5536 MCU boots in Normal mode</li> </ul>

#### Table 3. EVSE-SIG-BRD2X board jumpers...continued

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Part identifier	Jumper type/default	Description
J31	1x2-pin header	<ul> <li>VCC_3V3_S supply enable jumper:</li> <li>Open: VCC_3V3_S supply is OFF.</li> <li>Shorted (default setting): VCC_3V3_S supply is produced from 3.3V_SYS supply.</li> </ul>
J32	1x2-pin header	<ul> <li>SJA1110B SPI host connection enable jumper:</li> <li>Open (default setting): The SJA1110B SPI interface cannot connect to a host controller board.</li> <li>Shorted: SJA1110B SPI interface (master) can connect to a host controller board (slave).</li> </ul>
J38	1x3-pin header	<ul> <li>HPGP (CG5317) SPI master selection jumper:</li> <li>Pins 1-2 shorted (default setting): Host controller SPI chip select 1 is connected.</li> <li>Pins 2-3 shorted: Host controller SPI chip select 2 is connected.</li> </ul>
J41	1x3-pin header	Arduino socket connector J40 UART port control jumpers:
J42		<ul> <li>Pins 1-2-3 open: J40 UART port is connected to the expansion connector J44 UART port.</li> <li>Pins 1-2 shorted (default setting): J40 UART port is connected to the LPC5536 MCU UART port.</li> <li>Pins 2-3 shorted: J40 UART port is connected to the HPGP (CG5317 PHY) UART port.</li> </ul>
J43	1x3-pin header	<ul> <li>Host controller SPI interrupt source selection jumper:</li> <li>Pins 1-2 shorted (default setting): HPGP (CG5317) SPI interface is selected as the interrupt source.</li> <li>Pins 2-3 shorted: SJA1110B switch is selected as the interrupt source.</li> </ul>
J47	1x3-pin header	EV charging ventilation option selection jumper:
J48		<ul> <li>Pins 1-2 shorted (default setting): 1.3 kΩ resistance (R47) is ON; the vehicle can be charged in an unventilated area.</li> <li>Pins 2-3 shorted: 530 Ω resistance (R46 + R772) is ON; the vehicle can be charged only in a ventilated area.</li> <li>Note: Both J47 and J48 serve the same purpose. J47 is used for MCU-controlled switching whereas J48 is used for manual switching. Only one of them can be used at a time. By default, J47 is used.</li> </ul>
J51	1x3-pin header	<ul> <li>EVSE/EV control pilot I/O control jumper:</li> <li>Pins 1-2 shorted: EVSE/EV control pilot is disconnected from J15/J16. EVSE/EV control pilot data transfer happens over LIN.</li> <li>Pins 2-3 shorted (default setting): EVSE/EV control pilot is connected to J15/J16. Allows normal operation</li> </ul>
J53	1x2-pin header	<ul> <li>Pins 1-2 shorted (default setting): LIN Master for EVSE configuration.</li> <li>Pins 1-2 open: LIN Slave for EV configuration</li> </ul>

#### Table 3. EVSE-SIG-BRD2X board jumpers...continued

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## 1.6 Push button and DIP switch

The EVSE-SIG-BRD2X has one push button SW1 and one dual inline package (DIP) switch SW2, as shown in Figure 6.



Figure 6. Push button and DIP switch on EVSE-SIG-BRD2X

Table 4 describes the EVSE-SIG-BRD2X push button.

Table 4. EVSE-SIG-BRD2X push button

Part identifier	Supported function	Description
SW1	Emergency relay stop button	This push button can be used to turn OFF the relay during an emergency. Usually, the LPC5536 / LPC55S36 MCU is used to turn ON / turn OFF the relay.

SW2 is a 6-pin DIP switch for manually controlling the power-on bootstrap functions of the SJA1110B Ethernet switch on the EVSE-SIG-BRD2X.

Each pin of the DIP switch has the following two positions:

- OFF position (pin has value 0)
- ON position (pin has value 1)

A DIP switch pin can be moved manually from OFF position to ON position and vice versa.

Table 5 describes the DIP switch SW2.

#### Table 5. EVSE-SIG-BRD2X DIP switch

Part identifier	Switch name	Description
SW2	Boot strap switch for SJA1110	ON OFF 6 OFF 6 f-pin DIP switch

Table 6 describes SW2 settings / SJA1110B bootstrap configuration.

Pin pair	Description
SW2[1]	1: Always ON position (default setting)
SW2[2:3]	<ul> <li>BOOT_OPTION[0:1]:</li> <li>00: Serial Download mode. An image is downloaded at Linux boot time.</li> <li>01: Boot from EEPROM (reserved)</li> <li>10: Boot from SPI flash</li> <li>11: Boot from QSPI flash (default setting)</li> </ul>
SW2[4]	PHY_M_S5: • 0: PHY slave port (default setting) • 1: PHY master port
SW2[5]	<ul> <li>PHY_AUTO_POL_DET:</li> <li>0: If polarity is wrong, link training is blocked</li> <li>1: Fully automated polarity detection and correction for 100BASE-T1 PHY port 5 (default setting)</li> </ul>
SW2[6]	<ul> <li>PHY_AUTO_MODE: Automatic mode select:</li> <li>0: Managed mode</li> <li>1: Automatic mode. The 100BASE-T1 PHY starts link training automatically (default setting).</li> </ul>

#### Table 6. SW2 settings / SJA1110B bootstrap configuration

## 1.7 LEDs

The EVSE-SIG-BRD2X has light-emitting diodes (LEDs) to monitor system functions. The information collected from LEDs can be used for debugging purposes.





#### Figure 7. EVSE-SIG-BRD2X LEDs

Table 7 describes the EVSE-SIG-BRD2X LEDs.

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Part identifier	PCB label	LED color	Description (when LED is ON)
D1	PWR 5.0 V	Green	5V_SYS supply is available
D2	PWR 3.3 V	Green	3.3V_SYS supply is available
D18	PWR	Green	User application LED 1
D19	PWR	Green	User application LED 2
D21	ALIVE	Green	SJA1110B is up and running
D24		Green	Link activity is in progress for SJA1110B switch 100 BASET1 port 5.
D33		Green	SJA1110B switch subsystem configuration is complete

## 2 Featured interfaces

This section contains the following subsections:

- <u>Section 2.1 "Power supply"</u>
- <u>Section 2.2 "Proximity pilot"</u>
- Section 2.3 "Control pilot"
- Section 2.4 "GFCI circuit"
- Section 2.5 "Relay driver circuit"
- <u>Section 2.6 "Host connectors"</u>
- Section 2.7 "CAN PHY"
- <u>Section 2.8 "LIN PHY"</u>
- Section 2.9 "Auxiliary/debug UART port"
- Section 2.10 "LPC5536/LPC55S36 MCU"

## 2.1 Power supplies

The EVSE-SIG-BRD2X board draws power from the host EVK connectors, for example, Arduino, EXP-CN, or MFP connector. To drive external relays (140 mA or above generated at 12 V), the board has a DC power jack for supplying 5 V external power.

Table 8 shows the EVSE-SIG-BRD2X power supply sources.

Power source	Power supply rail	Description	
Through J37 pin 5	5V_ARD_EXP_CN	The power supply is received from a host board with the	
Through J44 pins 2 and 4		Arduino, EXP CN, or MFP ( <u>S32G-VNP-RDB2</u> )	
Through J45 pin 1			
Through the DC power jack, J1	DC_5V_IN	The power supply is received through an external 5 V DC power source	
Through J2 pin 2	5V_SYS	Board 5 V power; it can be either selected from 5V_ARD_ EXP_CN or DC_5V_IN or supplied from an external power source	
Through J37 pin 4	3V3_ARD_EXP_CN	The power supply is received from a host board with the Arduino, EXP CN, or MFP ( <u>S32G-VNP-RDB2</u> )	
Through J44 pins 1 and 17			
Through J45 pin 3			
Through J3 pin 2	3.3V_SYS	Board 3.3 V power; it can be either selected from 3V3_ ARD_EXP_CN or VDD_3V3 or supplied from an external power source	
U1	VCC_1V1	1.1 V power supply for the SJA1110B switch core	
U1	VDD_3V3	3.3 V output from PMIC	
U19	12V0	Board 12 V power that powers the control pilot PWM op-amp and the relay MOSFET	
U3	-12V0	Board 12 V power that powers the control pilot PWM op-amp	

Table 8. Power supply sources of EVSE-SIG-BRD2X board

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## 2.2 Proximity pilot

<u>Table 9</u> shows the proximity pilot signal with the connector positions available on the board.

Connector	Connector type	Pin	Signal name	Description
J9	Terminal block	1	PROX_PILOT (PP)	Proximity pilot signal on terminal connector
JP1	Test point header	1	PROX_PILOT (PP)	Proximity pilot test point

Table 9. EVSE-SIG-BRD2X jumper settings for proximity pilot

## 2.3 Control pilot

<u>Table 10</u> shows the control pilot signal with the connector positions available on the board.

Connector	Connector type	Pin/s	Signal name	Description
J9	Terminal block	2	СР	J1772 control pilot PWM
J15	SMA	1	CP_ANA	ISO 15118 control pilot
J16	Terminal block	2A, 2B	CP_ANA	ISO 15118 control pilot
J51	1x3-pin header	1, 2, 3	CP_ANA, LIN_CP	<ul> <li>Short pins 2 and 3 to combine PWM signal to ISO 15118 signal</li> <li>Short pins 1 and 2 to transfer PWM signal through LIN</li> </ul>

Table 10. EVSE-SIG-BRD2X connector settings for control pilot

<u>Table 11</u> summarizes the bootstrap jumpers of HPGP CG5317.

Table	11.	CG5317	boot	strap	pins
					P

Jumper	Bootstrap function description
J21, J17, J19	MII_PHY_ADD[2-0] of CG5317 Ethernet PHY: • J21, J19, J17 are configured as 2:0, where the value is '1' for position 1, 2 and '0' for
	position 3. Therefore, the default value is 011.
J18	SPI_CLK_MODE:
	<ul> <li>Pins 1 and 2 shorted = Value '1' = SPI MODE 1</li> </ul>
	<ul> <li>Pins 2 and 3 shorted = Value '0' = SPI MODE 3 (default)</li> </ul>
J20	BOOT_SRC:
	<ul> <li>Pins 1 and 2 shorted = Value '1' = HOST</li> </ul>
	<ul> <li>Pins 2 and 3 shorted = Value '0' = AUTO (default)</li> </ul>
J22	UART_DISABLE:
	<ul> <li>Pins 1 and 2 shorted = Value '1' = DISABLE (default)</li> </ul>
	<ul> <li>Pins 2 and 3 shorted = Value '0' = ENABLE</li> </ul>

*Note:* Ensure that the power isolation jumpers J11, J12, and J13 are always shorted.

## 2.4 GFCI circuit

Table 12 shows the GFCI coil input signal available on the board with the connector positions.

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Connector	Connector type	Pin	Signal name	Description
J23	Header	1, 2	GFCI coil terminal pair	Connect the external GFCI coil here

#### 2.5 Relay driver circuit

Table 13 shows the relay driver DC coil output signal available on the board with the connector positions.

Table 13.	EVSE-SIG-BRD2X	connector settings	for relay	driver circuit
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Connector	Connector type	Pin	Signal name	Description
J24	Terminal block	1, 2	Relay coil connector	Connect the external relay here

#### 2.6 Host connectors

EVSE-SIG-BRD2X supports connection for several different host processor development boards, via a SPI connection to the HPGP and a UART to the onboard LPC5536/LPC55S36 MCU.

The supported connections are listed below:

- Arduino UNO R3 connectors, which fetch power from the host board and support SPI and UART connections. The Arduino interface is used to connect the EVSE-SIG-BRD2X to a development board for the i.MX RT crossover MCU (<u>MIMXRT1060-EVK</u>) or an S32K3 automotive MCU (<u>S32K3X4EVB-T172</u>).
- i.MX EXP-CN connector, which is an alternative to Arduino UNO and provides easy connection to i.MX evaluation kit (EVK) boards, for example <u>8MNANOD4-EVK</u> and <u>i.MX93EVK</u>.
- MFP, which provides an easy connection to the <u>S32G-VNP-RDB2</u> or <u>S32G-VNP-RDB3</u> development board.

<u>Table 14</u>, <u>Table 15</u>, <u>Table 16</u>, and <u>Table 17</u> show the pinouts of the Arduino connectors J37, J39, J36, and J40, respectively.

#### Table 14. Arduino connector J37 pinout

Pin numbers	Signal name	Туре	Description
4	3V3_ARD_EXP_CN	Power	+3.3 V
5	5V_ARD_EXP_CN	Power	+5 V
6, 7	Ground		Ground
1, 2, 3, 8			Not connected

#### Table 15. Arduino connector J39 pinout

Pin numbers	Signal name	Туре	Description
1	HPGP_GP_IRQ	0	HPGP general-purpose interrupt
3	HOST_SPI_IRQ	0	HPGP_SPI_IRQ    SW_INT_N (selection through J43): • HPGP_SPI_IRQ: HPGP SPI interrupt • SW_INT_N: SJA1110B switch interrupt
4	HPGP_RESET	I	HPGP reset signal
2, 5, 6			Not connected

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#### Table 16. Arduino connector J36 pinout

Pin numbers	Signal name	Туре	Description
2	HOST_SPI_CS1	I	Host SPI master chip select option 1
3	HOST_SPI_CS2	I	Host SPI master chip select option 2
4	HOST_SPI_MOSI	I	Host SPI master output slave input signal
5	HOST_SPI_MISO	0	Host SPI master input slave output signal
6	HOST_SPI_CLK	1	Host SPI master clock
7	Ground		Ground
1, 8, 9, 10			Not connected

#### Table 17. Arduino connector J40 pinout

Pin numbers	Signal name	Туре	Description
1	HOST_UART_TXD	0	Host UART transmit
2	HOST_UART_RXD	I	Host UART receive
3, 4, 5, 6, 7, 8			Not connected

Table 18 shows the pinout of the EXP CN connector J44.

#### Table 18. EXP CN connector J44 pinout

Pin numbers	Signal name	Туре	Description
1, 17	3V3_ARD_EXP_CN	Power	+3.3 V
2, 4	5V_ARD_EXP_CN	Power	+5 V
7	HOST_SPI_IRQ	0	HPGP_SPI_IRQ    SW_INT_N (selection through J43): • HPGP_SPI_IRQ: HPGP SPI interrupt • SW_INT_N: SJA1110B switch interrupt
8	HOST_UART_RXD	1	Host UART receive
10	HOST_UART_TXD	0	Host UART transmit
11	HPGP_GP_IRQ	0	HPGP General-Purpose Interrupt
12	HPGP_RESET	1	HPGP Reset signal
16	HPGP_SPI_CS2	1	Host SPI master chip select option 2
19	HOST_SPI_MOSI	1	Host SPI master output slave input signal
21	HOST_SPI_MISO	0	Host SPI master input slave output signal
23	HOST_SPI_CLK	1	Host SPI master Clock
24	HPGP_SPI_CS1	1	Host SPI master chip select option 1
6, 9, 14, 20, 25, 30, 34, 39	Ground		Ground
3, 5, 13, 15, 18, 22, 26, 27, 28, 29, 31, 32, 33, 35, 36, 37, 38, 40			Not connected

Table 19 shows the pinout of the MFP connector J45.

Pin numbers	Signal name	Туре	Description
1	5V_ARD_EXP_CN	Power	+5 V
3	3V3_ARD_EXP_CN	Power	+3.3 V
9	LIN1	I/O	LIN master 1
10	LINO	I/O	LIN master 0
11	LIN3	I/O	LIN master 3
12	LIN2	I/O	LIN master 2
13	HPGP_GP_IRQ	0	HPGP general-purpose interrupt
14	HOST_SPI_IRQ	0	HPGP_SPI_IRQ    SW_INT_N (selection through J43): • HPGP_SPI_IRQ: HPGP SPI interrupt • SW_INT_N: SJA1110B switch interrupt
15	HOST_SPI_MISO	0	Host SPI master input slave output signal
16	HOST_SPI_MOSI	I	Host SPI master output slave input signal
17	HOST_SPI_CS1	I	Host SPI master chip select option 1
18	HOST_SPI_CLK	I	Host SPI master clock
5, 6, 7, 19, 20, 21	Ground		Ground
2, 4, 8, 22, 23, 24, 25, 26			Not connected

### Table 19. MFP connector J45 pinout

## 2.7 CAN PHY

The board supports a CAN PHY (NXP TJA1044GT) on board to communicate with other devices in the EV/ automotive use case.

 Table 20. CAN header connector J6 pinout

Pin	Signal name	Туре	Description
1	Ground		
2	CANH	Ю	CAN differential high signal
3	CANL	Ю	CAN differential low signal

## 2.8 LIN PHY

The MFP supports local interconnect network (LIN) interfaces through LIN PHY TJA1021T at connector J45 pins 9, 10, 11, and 12.

## 2.9 Auxiliary / debug UART port

An additional UART port is provided to integrate an external meter board for communication. This option is applicable when the host controller board does not communicate directly with the meter board due to connectivity limitation.

The port can be used to print serial debug logs of LPC5536. Connect an external PC UART TTL serial port adapter to J46 pins 2, 3, and 4 as shown in <u>Table 21</u>.

Pin	Signal name	Туре	Description
1	MCU_VDD	Power	+3.3 V
2	M_UART_TXD	0	UART transmit
3	M_UART_RXD	I	UART receive
4	Ground		Ground

#### Table 21. Auxiliary header connector J46 pinout

## 2.10 LPC5536/LPC55S36 MCU

EVSE-SIG-BRD2X hosts an LPC5536/LPC55S36 MCU controller to support the required local controller functions of the board. Therefore, this MCU acts as a utility controller for the EVSE system.

#### 2.10.1 LPC5536/LPC55S36 SWD debug

EVSE-SIG-BRD2X provides a single wire debug (SWD) port through connector J30 for debugging the LPC5536/LPC55S36 MCU.

User can use an <u>MCU-Link Debug Probe</u>, <u>MCU-Link Pro Debug Probe</u>, or <u>PE micro</u> to program and debug this MCU.



Figure 8. MCU-Link Debug Probe and MCU-Link Pro Debug Probe

#### 2.10.2 LPC5536/LPC55S36 ISP programming

EVSE-SIG-BRD2X uses In-System Programming (ISP) through the UART interface to program LPC5536/ LPC55S36. UART peripheral implements auto-baud detection. To set up LPC5536/LPC55S36 for ISP programming, the ISP mode selection jumper J29 must be changed from the default shorting state to open.

Table 22 shows the setting of J29 for boot mode selection.

Table 22. EVSE-SIG-BRD2X LPC5536/LPC55S36 boot mode selection

Jumper 29 state	Boot mode
Closed (default)	Internal flash boot
Open	ISP boot

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# 3 EVSE-SIG-BRD2X EVSE configuration

To simulate an EVSE system with the EVSE-SIG-BRD2X, one of the compatible host platforms can be used. The compatible interfaces suggested for the EVSE host are as follows:

- A host board with an Arduino Uno interface; for example, MIMXRT1064-EVK, MIMXRT1060-EVKB
- A host board with EXP CN/GPIO connector interface; for example, <u>8MNANOD4-EVK</u>, <u>i.MX93EVK</u>

## 3.1 Host controller i.MX RT1060-EVKB

Figure 9 shows a connection diagram of the i.MX RT1060-EVKB host board with EVSE-SIG-BRD2X.



Figure 9. Connection between i.MX RT1060-EVKB and EVSE-SIG-BRD2X boards

Figure 10 shows i.MX RT1060-EVKB and EVSE-SIG-BRD2X after the interconnection.



Figure 10. i.MX R106x-EVK and EVSE-SIG-BRD2X boards connected

Also, peripheral boards for NFC, secure element, WiFi adapter, and TFT display can also be connected as described in EasyEVSE platform documents.

## 3.2 Host controller i.MX 93-EVK

Figure 11 shows a connection diagram of the i.MX 93-EVK host board with EVSE-SIG-BRD2X.



## 3.3 EVSE configuration

## 3.3.1 LIN Master

To configure the device as LIN master, short jumper J53 as shown in <u>Figure 12</u>. User can transfer CP data through LIN as well by shorting pins 1 and 2 of the jumper J51. See <u>Figure 13</u>.



Figure 12. Short jumper J53 to configure the device as LIN master



Figure 13. Short pins 1 and 2 of jumper J51 for transfer of CP data through LIN master

#### 3.3.2 Proximity pilot sense

The proximity pilot terminal is available at connector J9 pin 1, which can be connected to the proximity pilot wire of the charging cable.

Alternatively, the JP1 jumper point allows the access to the signal.

Depending on when the board is used in the EVSE configuration or EV configuration, there is a different configuration for proximity pilot on the board. The jumper header J10 is shorted through pins 1 and 2 by default for the EVSE configuration.

To set up the proximity pilot for EV configuration, perform the following steps:

- 1. Remove the resistor 0  $\Omega$  R781 on the bottom side of the board.
- 2. Solder it to the empty resistor R55 footprint on the top side of the board.
- 3. Also, move jumper header J10 short to pins 2 and 3 from the default position 1 and 2.





#### EVSE-SIG-BRD2X Board User Guide

Terminal connector/Jumper setup	Setting	Description
18	Pin 1	Sector Control
J10	<ul> <li>J10 pins 1 and 2 short (default): EVSE mode</li> <li>J10 pins 2 and 3 short: EV mode</li> </ul>	1 0 OTP5 C47 R56 R52 JP1

#### Table 23. Connectors/jumpers for proximity pilot in EVSE/EV setup

#### 3.3.3 Control pilot

In the EVSE-SIG-BRD2X, the jumper J8 pins 1 and 2 must be shorted to route the PWM signal to the terminal connector J9 pin 2.

The HPGP CG5317 on board does the ISO 15118 signal and data communication. To combine the J1772 PWM to the ISO 15118 signal, the jumper J51 pins 1 and 2 must be shorted. It results in a combined J1772 and ISO 15118 signal output at the terminal connector J9 pin 2.

Table 24.	Connectors/	jumpers	for control	pilot in	<b>EVSE</b> setup

Terminal connector/Jumper setup	Setting	Description
78	Pin 2	J9 pin 2 is the control pilot signal in the terminal
J8	Pins 1 and 2 short	Short pins 1 and 2 for EVSE mode
J51	Pins 1 and 2 short	Short pins 1 and 2 of J51 to allow transfer of CP data through LIN

## 3.3.4 GFCI

GFCI coil can be connected to EVSE-SIG-BRD2X at header J23 between pins 1 and 2.

#### 3.3.5 Relay connection

One or two external relays with the DC coils operating at 12 V can be driven using the relay driver connector J24 pins 1 and 2.



Figure 15. External relay connection to EVSE-SIG-BRD2X

#### 3.3.6 SPI host connection

Host controller SPI leader can be connected to EVSE-SIG-BRD2X SPI follower using one of the following options:

- Arduino connector J36 pinout and Arduino connector J39 pinout
- EXP CN connector J44 pinout
- MFP connector J45 pinout

## 3.3.7 UART host connection

Host controller UART serial port can be connected to EVSE-SIG-BRD2X UART using one of the following options:

- <u>Arduino connector J40 pinout</u>
- <u>EXP CN connector J44 pinout</u>

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#### MFP connector J45 pinout

#### 3.3.8 Ethernet host connection

Host controller Ethernet port can be connected to EVSE-SIG-BRD2X using one of the following options:

- RJ45 connector P4 (100BASE-TX)
- J34 connector (100BASE-T1)

#### 3.3.9 Auxiliary UART

An auxiliary UART port can be connected to connector header J46. The host controller can communicate to another UART peripheral through this UART port when the command requests arriving from host connectors is passed through the LPC5536/LPC55S36.

# 4 EVSE-SIG-BRD2X EV configuration

## 4.1 Host controller S32G2-VNP-RDB2

Figure 16 shows connection diagram of <u>S32G-VNP-RDB2</u> host board with EVSE-SIG-BRD2X.



Figure 16. Connection between S32G2-VNP-RDB2 and EVSE-SIG-BRD2X

## 4.2 EV configuration

## 4.2.1 LIN slave

To configure the device as LIN slave, open jumper J53 as shown in Figure 17. User can transfer CP data through LIN as well by shorting pins 1 and 2 of the jumper J51. See Figure 18.



Figure 17. Open jumper J53 to configure the device as LIN slave



Figure 18. Short pins 1 and 2 of J51 to allow transfer of CP data through LIN slave

#### 4.2.2 Proximity pilot sense

To use the proximity pilot hardware of the board for the EV simulation case, some modifications are required as follows:

- 1. Populate a 0  $\Omega$  resistor at R55.
- 2. Move J10 from default position 1 and 2 to position 2 and 3.

Note: This configuration can be the same as for the EVSE simulation, see Section 3.3.1 "Proximity pilot sense".

#### 4.2.3 Control pilot

In the EV simulation, the jumper J8 pins 3 and 4 must be short to route the PWM signal to the terminal connector J9 pin 2.

EV states can be changed to state C or D, as per J1772, either manually or via MCU GPIO control as follows:

- For MCU-controlled state switching, use header J48 pins 1 and 2. These pins must be shorted for state C indication, that is, charging without ventilation. Pins 2 and 3 of J48 must be short together for state D indication, that is, charging with ventilation.
- For manually controlled state switching, use header J47 pins 1 and 2. These pins must be shorted for state C indication, that is, charging without ventilation. Pins 2 and 3 of J47 must be shorted together for state D indication, that is, charging with ventilation.

The HPGP CG5317 on the EVSE-SIG-BRD2X board does the ISO 15118 signal and data communication. To combine the J1772 PWM to the ISO 15118 signal, the jumper J51 pins 1 and 2 must be shorted. It helps route the ISO 15118 signal input from the terminal connector J9 pin 2 to the HPGP circuit of the board.

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## EVSE-SIG-BRD2X Board User Guide

Terminal connector/jumper setup	Setting	Description
19	Pin 2	J9 pin 2 is the control pilot signal in the terminal
J8	Pins 3 and 4 short	Short pins 3 and 4 for EVSE mode
J51	Pins 1 and 2 short	Short pins 1 and 2 of J51 to allow transfer of CP data through LIN

#### Table 25. Connectors/jumpers for control pilot in EV setup

#### 4.2.4 SPI host connection

For details, refer Section 3.3.5 "SPI host connection".

#### 4.2.5 UART host connection

For details, refer Section 3.3.6 "UART host connection".

#### 4.2.6 Ethernet host connection

For details, refer Section 3.3.7 "Ethernet host connection".

#### 4.2.7 Auxiliary UART

For details, refer Section 3.3.8 "Auxiliary UART".

## 5 Software development

This section describes the software requirements to get started with software development with EVSE-SIG-BRD2X.

Required software	Description	Link/how to access	Additional information or comment
IDE	MCUXpresso IDE	MCUXpresso Integrated Development Environment (IDE)	For IDE installation details, refer <u>Section 6</u> "Downloading and installing MCUXpresso IDE in Windows 10".
SDK	LPC5536 SDK	MCUXpresso SDK Builder	<ul> <li>Download and install the LPCXpresso55S36 SDK v 2.14.0 to compile version V1 of the EVSE-SIG-BRD2X projects.</li> <li>SDK installation; for more details, refer Section 7 "Downloading and installing LPC5536/LPC55S36 SDK".</li> </ul>
Base software	EVSE-SIG-BRD2 X EVSE simulation software	TBD	
Base software	EVSE-SIG-BRD2X EV simulation software	TBD	

Table 26. Required software for EVSE-SIG-BRD2X

## 5.1 MCUXpresso IDE

The MCUXpresso IDE is used to edit, build, and program the provided EVSE-SIG-BRD2X MCUXpresso sample projects.

It is available for download at MCUXpresso-IDE.

For details on how to download and install the MCUXpresso IDE, using Windows OS, refer <u>Section 6</u> "Downloading and installing MCUXpresso IDE in Windows 10".

## 5.2 EVSE-SIG-BRD2X MCUXpresso sample project

The two sample projects mentioned in this document are as follows:

- EVSE-SIG-BRD2X EVSE simulation project (LPC5536)
- EVSE-SIG-BRD2X EV simulation project (LPC5536)

Ensure to import and program the corresponding project variant for the specific EVSE-SIG-BRD2Xs for EVSE and EV simulations. For details on how to import the sample projects, refer <u>Section 6 "Downloading and installing MCUXpresso IDE in Windows 10"</u> and <u>Section 7 "Downloading and installing LPC5536/LPC55S36 SDK"</u>.

#### 5.3 MCUXpresso SDK

To build the EVSE-SIG-BRD2X EVSE/EV sample projects, the following SDK is required:

LPC5536 EVK MCUXpresso SDK

The SDK is available for download at MCUXpresso SDK Builder.

For details on download and installation, refer <u>Section 7 "Downloading and installing LPC5536/LPC55S36</u> <u>SDK"</u>.

## 5.4 Programming EVSE-SIG-BRD2X software

#### 5.4.1 Building EVSE simulation software

To build EVSE simulation software, perform the following steps:

- 1. Click Import project(s) from the file system... from the Quickstart Panel of MCUXpresso IDE.
- 2. Select the \*.zip archive file and import the EVSE simulation project evsesigbrd\_sw.zip.
- 3. Click the **Finish** button.

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Create a new C/C++ project  Timport SDK example(s)  Timport project(s) from file system  Build town created	Installed SDKs Name I B SDK	Available Boards / Available Devices         Location           SDK Version         Manifest Version         Location           2x_EVK-MIMXRT1054         213.0 %67 2023-01-1 3.10.0         \$	2_13_0

- 4. Click the button on the top-left side of the IDE and start building the project. The build is done without errors.
- 5. Click the button on the top-left side of the IDE and start programming the board with the project binary. Once the programming is completed, it breaks at a breakpoint at the main() function of the code.

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∽ 🛵 > source	128 lpadc_conv_command_config_t mLpadcCommandConfigStruct;
> 😂 commport	129
> [d] > control_pilot_proc.c	130 /* Board pin, clock, debug console init */
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> I6 lpc_switch_comm.c	132 CLOCK_SECLEDIV/RECOK_DEVELEX.complex_du_taise);
> 19 main.c	134 CLOCK AttachClk(BOARD DEBUG UART CLK ATTACH):
> is proximity_pilot_proc.c	135 /* attach 12 MHz clock to FLEXCOMM3 (LIN slave) */
> 😰 relay_oriver.c	CLOCK_SetClkDiv(kCLOCK_DivFlexcom3Clk, 0u, false);
> is seminost_narotaut.c	137 CLOCK_SetClkDiv(kCLOCK_DivFlexcom3Clk, 1u, true);
> B sigpro_application.n	138 CLOCK_ATTAChCLK(kFROIZM_to_FLEXCOMM3);
> Le types.h	1139 Winder LPC_10_53A_SPI_CUMM
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MCUXpresso IDE - Quickstart Panel	evsesigbrd_sw LinkServer Debug [C/C++ (NXP Semiconductors) MCU Application]
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2 🖉 🖾 Import SDK example(s)	
Import project(s) from file system	
Figure 20. Project explorer	

6. To resume the operation, click the

#### 5.4.2 Building EV simulation software

To build EV simulation software, perform the following steps:

1. Click Import project(s) from the file system... from the Quickstart Panel of MCUXpresso IDE.

button.

- 2. Select the \*.zip archive file and import the EV simulation project evsesigbrd sw.zip.
- 3. Click the **Finish** button.

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- 4. Click the button on the top-left side of the IDE and start building the project. The build is done without errors.
- 5. Click the button on the top-left side of the IDE and start programming the board with the project binary. Once the programming is completed, it breaks at a breakpoint at the main() function of the code.

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Figure 22. Project expl	orer	

6. To resume the operation, click the

button.

# 6 Downloading and installing MCUXpresso IDE in Windows 10

MCUXpresso IDE is a free-of-charge, code-size-unlimited, and easy-to-use IDE for Kinetis and LPC MCUs and i.MX RT crossover processors.

To install MCUXpresso IDE, perform the following steps:

1. Go to the MCUXpresso-IDE and click the Download button.

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Overview Software Details Do	ocumentation Design Resources 🛈 Training Support	DOWNLOADS
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FILTER BY	1 download	
Software Development Tools Development IDEs and Build Tools	DEVELOPMENT IDES AND BUILD TOOLS MCUXpresso Integrated Development Environment (IDE) FLEXERA Rev All Jan 10, 2024 1 KB MCUXPRESSO	DOWNLOAD
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3. If you are an existing user, click **Employee Sign In** and enter your email address or NXP ID, and password.

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### EVSE-SIG-BRD2X Board User Guide

	Sign in to your NXP o	account		
	Access your full NXP.com experience an our products and servic	d stay up to date o ces.	I	
	Email Address*			
	Password*	Show		
	Forgot your password? Reset it.			
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	Employee Sign In			
Figure 25. Signing in				
4. Click MCUXpresso IDE.				
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Select a version. To access older version	ons, click on the " Previous " tab			

Version Description Date Available	
11.9.0 MCUXpresso IDE Jan 10, 2024 Down	nload Log

#### Figure 26. MCUXpresso IDE

Note: Ensure to download the latest MCUXpresso version available.

5. Accept the software terms and conditions.

## **NXP Semiconductors**

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## EVSE-SIG-BRD2X Board User Guide

Software & Support Product List	Software Terms and Conditions
Product Search	MCUXpresso IDE
Order History	Please read the following agreement and click "I AGREE" at the bottom before downloading your software.
Recent Updates	LA_OPT_NXP_Software_License v56 April 2024
Licensing License Lists Offline Activation	IMPORTANT. Read the following NXP Software License Agreement ("Agreement") completely. By selecting the "I Accept" button at the end of this page, or by downloading, installing, or using the Licensed Software, you indicate that you accept the terms of the Agreement, and you acknowledge that you have the authority, for yourself or on behalf of your company,
FAQ Download Help	to bind your company to these terms. Tou may then download or install the file. In the event of a conflict between the terms of this Agreement and any license terms and conditions for NXP's proprietary software embedded anywhere in the Licensed Software file, the terms of this Agreement shall control. If a separate license agreement for the Licensed Software has been signed by you and NXP, then that
Table of Contents	agreement shall govern your use of the Licensed Software and shall supersede this Agreement.
FAQs	
	NXP SOFTWARE LICENSE AGREEMENT
	This is a legal agreement between your employer, of which you are an authorized representative, or, if you have no 🗸
	I Agree Cancel
Figure 27. Terms and condit	ions
3 Select the MCUXpresso	product version

7. To start the download, click the corresponding File Name.

Product Download			
MCUXpresso IDE			
Files License Keys Notes			wnload Help
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+ MCUXPRESSO v11.9.0 - MAC AARCH 64	1.1 GB	MCUXpressoIDE_11.9.0_2144.aarch64.pkg	
+ MCUXPRESSO v11.9.0 - Windows	1.1 GB	MCUXpressoIDE_11.9.0_2144.exe	
+ MCUXPRESSO v11.9.0-MAC-86-64	1 GB	MCUXpressoIDE 11.9.0. 2144 x86-64 pkg	

Figure 28. Starting the download

 Double-click the installer file and follow the setup wizard until the MCUXpresso IDE installation is completed. Allow the installation of the additional drivers required by the MCUXpresso IDE during the installation process.

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		→ Windows Security ×
		Would you like to install this device software?
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	Figure 29. Device Drivers for M	ICUXpresso IDE

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# 7 Downloading and installing LPC5536/LPC55S36 SDK

The following steps and illustrations show the setup processes for LPC5536-EVK, which can be used to as the SDK for LPC5536/LPC55S36 based EVSE-SIG-BRD2X.

- 1. Install and import the LPCXpresso55S36 SDK as follows:
  - a. Browse to MCUXpresso SDK Builder and click Select Development Board.
  - b. Sign in with your NXP account. If you do not have one yet, click <u>Register Now</u>, enter your credentials, and click **Sign-in**.

MCUXpresso SDK brings open applications to speed your software specific to your processor or evalual Be Select Development Board	SDK Builder source drivers, middleware, and reference development. Customize and download an ton board selections.	example SDK	SDK CFG SEC
Expansion Board Hub  NXP strongly recommends you upd  security updates for Bluetorth Low	Application Code Hub	that contains essential	

Figure 30. MCUXpressoSDK builder

- 2. Enter the name of the LPCXpresso55S36 board under **Search for Hardware**.
- 3. Select the required board from the drop-down list and select the recommended SDK release version.
- 4. Click Build MCUXpresso SDK.

SDK Dashboard	Select Development Board	
BUILD SDK	Search for your board or kit to get started.	Selection Details
<ul> <li>Middleware (0)</li> <li>Examples (0)</li> <li>Toolchain (Off)</li> <li>Processor Parametrics (Off)</li> </ul>	Search for Hardware           LPCXpress055536         ©         Q,	LPCXpresso55536 App (2) Powers (2) LPCXpresso Development Board for LPC5553x/3x family of MCUs
ADMINISTRATION	Select a Board, Kit, or Processor	Actions
Notifications	▼ Boards	(+) Add to Filtering Criteria
Preferences	▼ LPC	Evolore selection with Dine tool
EXPLORE	LPCXpresso55S36 (LPC55S36)	
Expansion Board Hub	✓ Kits	Explore selection with Clocks tool
Application Code Hub	✓ LPC	v2 14.0 A Build MCUXpresso SDK
DOWNLOADS	LPCXPRESSO55S36 with AGM01 (LPC55S36) Controlled access	
MCUXpresso IDE	LPCXpresso55S36-OM13790HOST (LPC55S36)	Matched Hardware Platforms
	<ul> <li>Processors</li> </ul>	Found [801] HW solutions that match your criteria.

Figure 31. Select development board

**Note:** Get the recommended SDK release version from section A.3 Recommended SDK release version.

5. When building the SDK, specify the **Host OS**, and specify "MCUXpresso IDE" as the **Toolchain**. For simplicity reasons, select all the available middleware and click **Download SDK**.

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## EVSE-SIG-BRD2X Board User Guide

Build Generate a Developer E Selections here Host OS	SDK for LPCXpresso55 downloadable SDK archive for use with desktop microment. Stelling repending host system, toolhain or middlewere) will impact file Windows	S36 MCUXpresso Tools. a and exemples projects included in the SDK and Todotalar /IDE Todotalar /IDE MCUXpresso IDE	/ Generated Projects	SDK Version SDK Tag	2.14.0 (released 2023-07-31) REL_2.14.0_NIOBE4ANALOG_REP3
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	Name	Category	Description	Depen	dencies
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$\checkmark$	CMSIS DSP Library	CMSIS DSP Lib	CMSIS DSP Software Library		
	emWin	Middleware	emWin graphics library		
$\checkmark$	Fatfs	Middleware	FAT File System stack		
	FreeMASTER	Middleware	FreeMASTER communication driver for 32bit platforms		
$\checkmark$	LittleFS	Middleware	LittleFS filesystem stack		
	LVGL 🗹	Middleware	LVGL Open Source Graphics Library		-
	FreeRTOS (1 selected)		Real-time operating system for microcontrollers from Amazon		~
$\checkmark$	Azure RTOS (7 selected)		Azure RTOS		~
			DOWNLOAD SDK		

## Figure 32. Build SDK for LPCXpresso55S36

6. When the build completes, download the SDK archive (9) and agree to the software terms and conditions.

Image: Construction of the second s		SDK_2.14.0_LPCXpresso55S36			2024-04-12	× Remove SDK
KOLVignesso IDE     REL_214 0, NIGBE4NAALOD, RFP3, RC2_2      CASIS DSP Lbray, CANopen, em/Vin, Fath, FreeRTOS, Littler S, Meesto Audio Framework for MCU, multicore, NTAG I2C, USB Host, Device, OTG Stack, LVGL, meedTLS, Meed Crypto, 2	1	Windows	<b>L9</b> 2.14.0	LPCXpresso55S36		Rebuild SDK
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#### Figure 33. LPCXpresso55S36 SDK Dashboard

- 7. Open the MCUXpresso IDE in your desired workspace.
- 8. Drag and drop the SDK into the Installed SDKs window of the IDE.

🔋 Installed SDKs × 🗔 Properties 😰 Problems 📮 Console 🖉	Terminal 📓 Image Info 📓 Debi	uggi 🗣   🗹 📜 =   Downloads		
<b>1</b> Installed SDKs				₽· ■
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all an SDK in MCUXpresso				

## 8 Related resources

Table 27 lists a few additional resources that you can refer while working on the EVSE-SIG-BRD2X User Guide.

Table 27. Related resources	
Resource	Link/how to obtain
EVSE-SIG-BRD2X User Manual (UM12128)	Contact your local NXP field applications engineer (FAE) or sales representative
SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler (J1772_201710)	https://www.sae.org/standards/content/j1772_201710/
Lumissil website (connectivity)	https://www.lumissil.com/products/wired-communication

# 9 Acronyms

<u>Table 28</u> lists the acronyms used in this document.

Table 28. Acronyms	
Term	Description
AFE	Analog front end
BSD	Berkeley software distribution
CAN	Controller area network
CP	Control pilot
EV	Electric vehicle
EVK	Evaluation kit
EVSE	Electric vehicle supply equipment
GFCI	Ground-fault circuit interrupter
HPGP	HomePlug Green PHY
IDE	Integrated development environment
LIN	Local interconnect network
MCU	Microcontroller unit
MFP	Multifunction port
MPU	Microprocessor unit
PHY	Physical layer
PP	Proximity pilot
PWM	Pulse width modulation
SDK	Software Development Kit
SPI	Serial peripheral interface
SWD	Serial wire debug
UART	Universal asynchronous receive transmit

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# 11 Revision history

Table 29 summarizes the revisions done to this document.

**Revision history** 

Document ID	Release date	Description
UG10140 v.1.0	1 August 2024	Initial public release

#### EVSE-SIG-BRD2X Board User Guide

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Document feedback Date of release: 1 August 2024 Document identifier: UG10140