UM90019

Dual output LCD bias power supply evaluation module

Rev. 1 — 24 January 2024 user manual

Document information

Information	Content
Keywords	NEX10000UB and NEX10001UB evaluation module
Abstract	This user's guide describes the NEX10000UB and NEX10001UB evaluation module. NEX10000UB and NEX10001UB are designed to provide power supply with positive and negative output voltage for TFT-LCD panel. This document contains the EVM schematics, EVM configuration, bill of materials (BOM), board layout drawing and assembly drawing.

nexperia

1. Introduction

This evaluation module (EVM) is designed for NEX10000UB and NEX10001UB, it can generate one positive output voltage and one negative output voltage. The EVM has I²C interface, which is used to change the output voltage. For easy evaluate this EVM board, you may need a tool to send command through I²C.

2. Features

The following features are available on this EVM:

- Input voltage range: 2.7 V to 5.0 V
- Positive output range (V_{POS}):
  - NEX10000UB: 4 V to 6 V
  - NEX10001UB: 4 V to 6.5 V
- Negative output range (V_{NEG}):
  - NEX10000UB: -4 V to -6 V
  - NEX10001UB: -4 V to -6.5 V
- Maximum output current:
  - NEX10000UB: 80 mA
  - NEX10001UB: 220 mA
- Use jumper to enable or disable Positive output and Negative output
- I²C interface to configure the output voltage

3. Application

- The EVM is used in the following applications:
  - Smart Phone TFT LCD
  - Tablet TFT LCD

4. Schematic

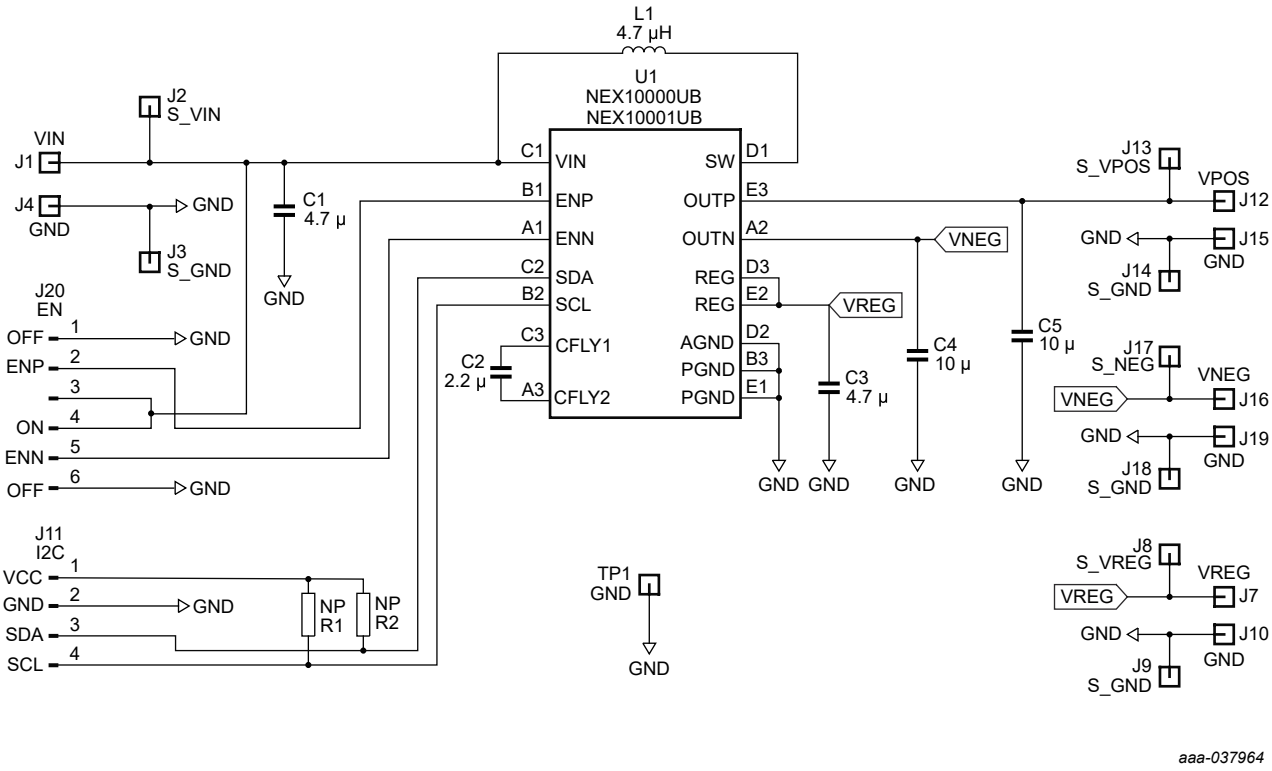

Fig. 1. NEX10000UB/NEX10001UB EVM board schematic

5. General configuration and description

This section describes the connectors, jumpers, and test points on the EVM and how to properly connect, set up and use the NEX10000UB/NEX10001UB EVM.

5.1. Physical access

Table 1 lists the NEX10000UB/NEX10001UB EVM connector, jumper and test points configuration.

Table 1. Connectors

Connector	Label	Descriptions
J1	VIN	Power input for this board
J2	S_VIN	V_{IN} sense and test point
J3, J9, J14, J18	S_GND	GND sense pins and test point
J4, J10, J15, J19, TP1	GND	Power ground
J7	VREG	V_{REG} output pin
J8	S_VREG	V_{REG} sense pin and test point
J11	I2C	I²C connector, includes SDA, SCL, V_{CC} and GND. V_{CC} is external pull-up voltage, if needed.
J12	VPOS	V_{POS} output pin
J13	S_VPOS	V_{POS} sense pin and test point
J16	VNEG	V_{NEG} output pin
J17	S_NEG	V_{NEG} sense pin and test point
J20	EN	Enable connector, includes ENN, ENP, GND and High (V_{IN}). User can use jumper to enable and disable V_{POS} and V_{NEG}

5.2. Test setup

Fig. 2 shows a typical setup for NEX10000UB/NEX10001UB EVM, apply 2.7 V to 5.0 V input voltage to V_{IN}, then connect the enable jumper, the output will have default 5.4 V on V_{POS} and -5.4 V on V_{NEG}. You can connect I²C master to SDA and SCL, then you can send I²C command to NEX10000UB/NEX10001UB to change the output voltage and other configurable function. Table 2 shows the register map of NEX10000, Table 3 shows the register map of NEX10001. For the details, you can refer to the data sheet of NEX10000UB and NEX10001UB.

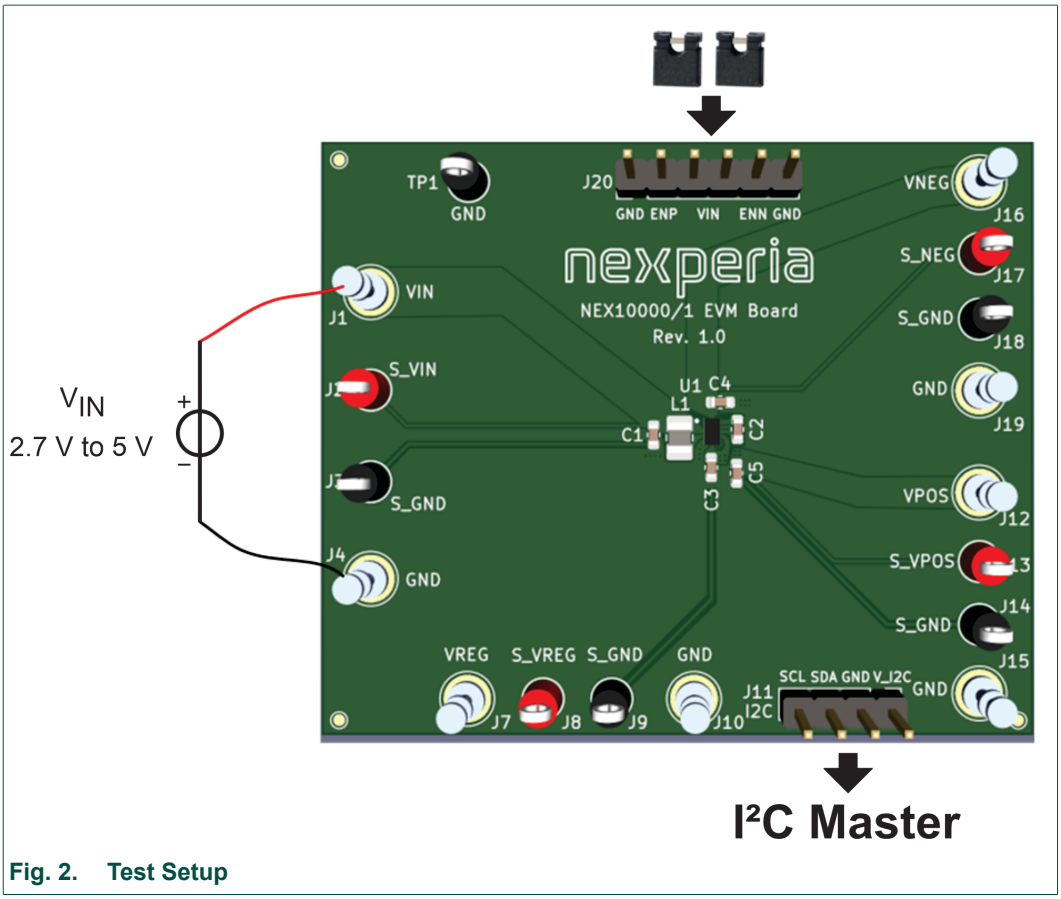

Fig. 2. Test Setup

Below is the register map of NEX10000UB and NEX10001UB.

Table 2. NEX10000UB register map

Address	Register Name	R/W	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x00	V_{POS} Register	R/W	Reserved			V_{POS} [4:0]					0x0E
0x01	V_{NEG} Register	R/W	Reserved			V_{NEG} [4:0]					0x0E
0x02	Vendor ID	R/W	Reserved						11		0x03

Table 3. NEX10001UB register map

Address	Register Name	R/W	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x00	V_{POS} Register	R/W	Reserved			V_{POS} [4:0]					0x0E
0x01	V_{NEG} Register	R/W	Reserved			V_{NEG} [4:0]					0x0E
0x02	CL & Vendor ID	R/W	Reserved			LDO_CL	Reserved		11		0x03

6. Board layout

Below is the board layout for different layer.

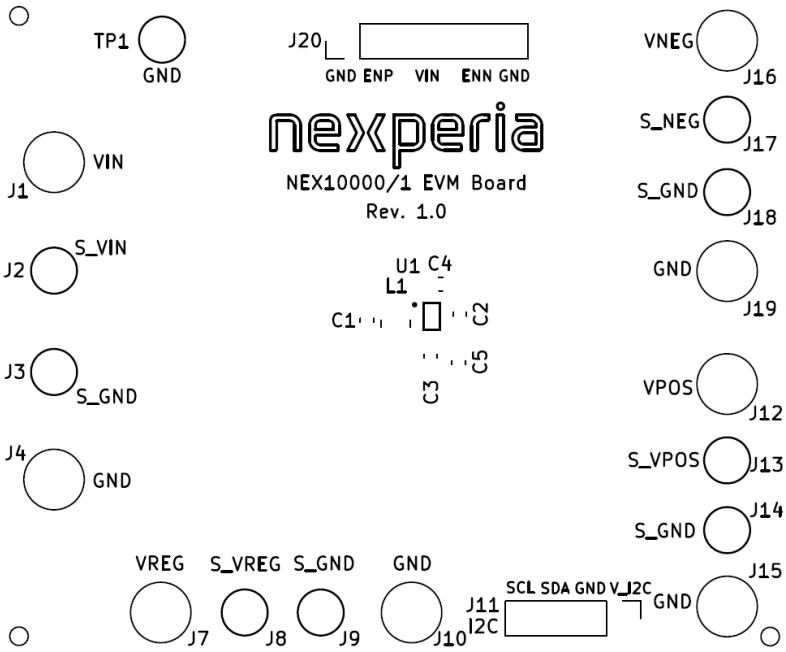

Fig. 3. Top silk screen layer

Fig. 4. Bottom silk screen layer

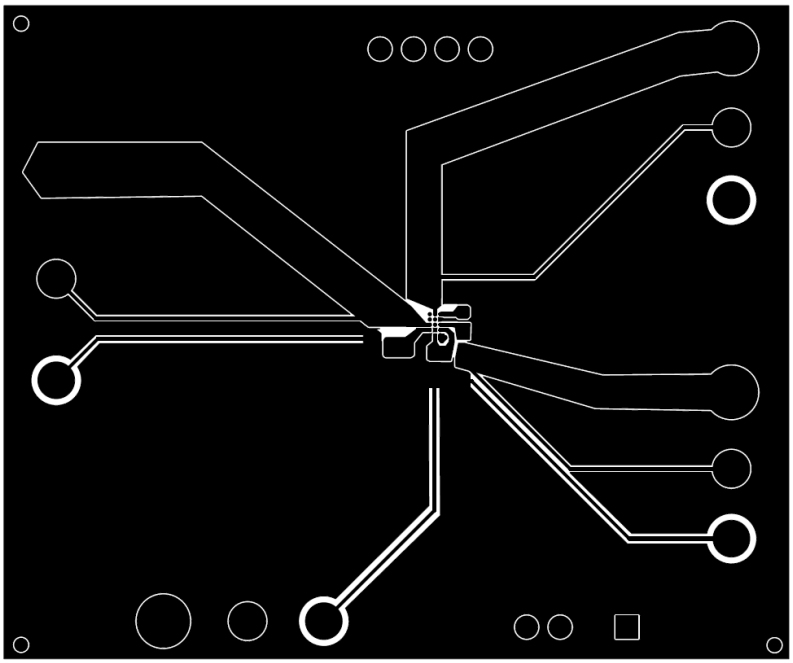

Fig. 5. Top layer

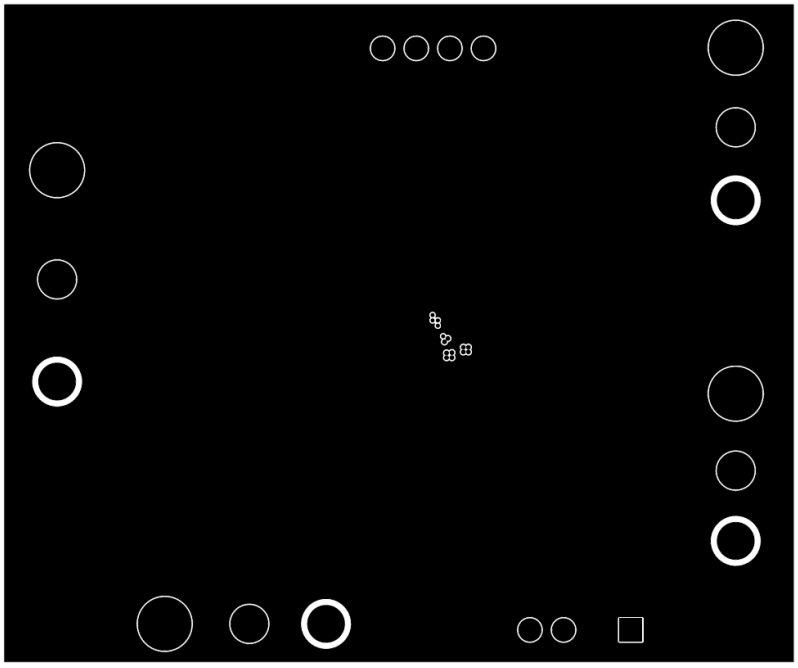

Fig. 6. Inner 1 layer

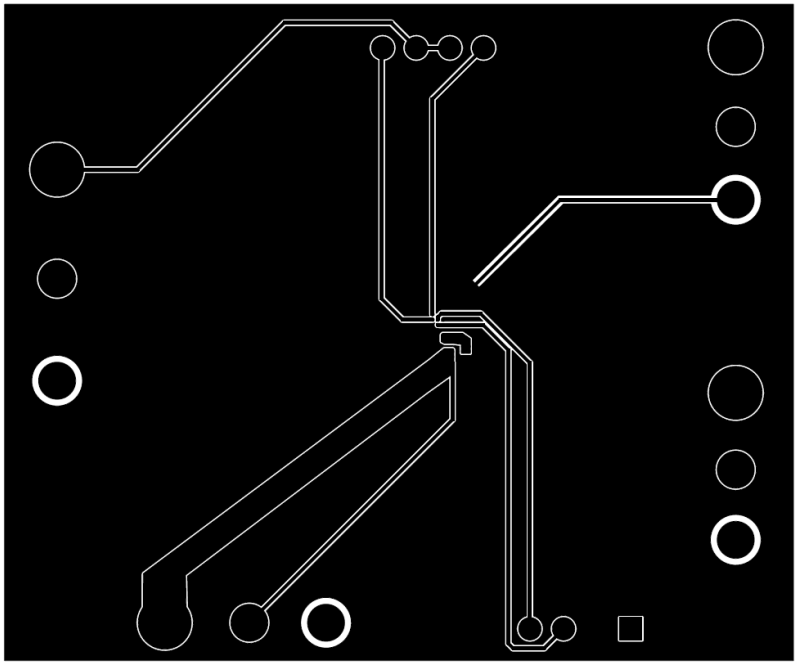

Fig. 7. Inner 2 layer

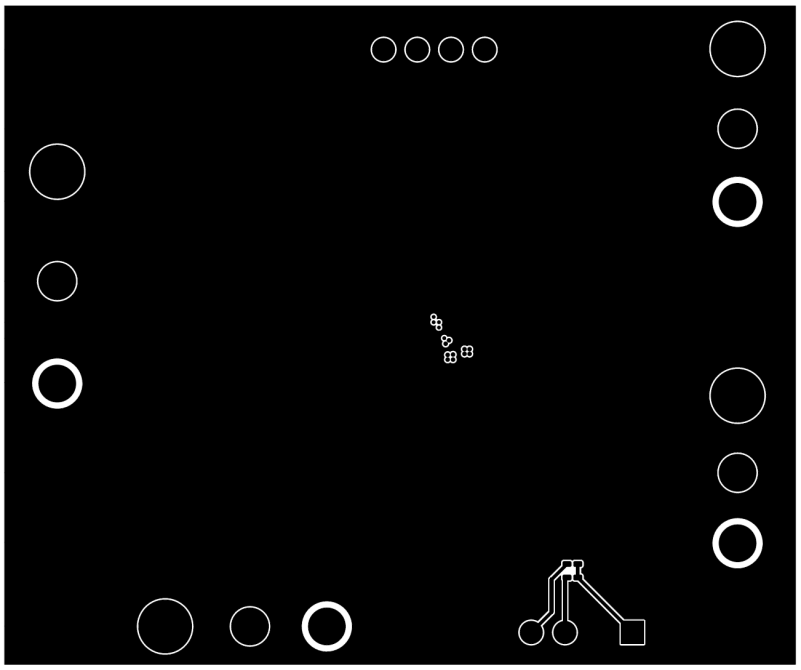

Fig. 8. Bottom layer

7. NEX10000UB and NEX10001UB EVM board Bill of Materials (BOM)

Table 4. NEX10000UB and NEX10001UB EVM board Bill of Materials

References	Value	Footprint	Quantity	Part Number	Manufacturer
NEX10000UB and NEX10001UB EVM board [1]					
C1, C3	4.7 µF	C_0603_1608Metric	2	C1608X5R1E475K080AC	TDK
C4, C5	10 µF	C_0603_1608Metric	2	C1608X5R1E106K080AC	TDK
C2	2.2 µF	C_0603_1608Metric	1	C1608X5R1C225KTK00E	TDK
R1, R2	NP	R_0201_0603Metric_Pad0.64x0.40mm_HandSolder	2	not place	
L1	4.7 µH	L_1008_2520Metric_Pad1.43x2.20mm_HandSolder	1	TMS252012ALM-4R7MTAA	TDK
U1	NEX10000UB/NEX10001UB	NEX10000UB/NEX10001UB (WLCSP15)	1	NEX10000UB/NEX10001UB	Nexperia
TP1	GND	TestPoint_Keystone_5005-5009_Compact	1	Keystone 5006	Keystone
J3, J9, J14, J18	S_GND	TestPoint_Keystone_5005-5009_Compact	4	Keystone 5006	Keystone
J4, J10, J15, J19	GND	TestPoint_Loop_D3.80mm_Drill2.5mm	4	Keystone1502-2	Keystone
J1	VIN	TestPoint_Loop_D3.80mm_Drill2.5mm	1	Keystone1502-2	Keystone
J2	S_VIN	TestPoint_Keystone_5005-5009_Compact	1	Keystone 5005	Keystone
J7	VREG	TestPoint_Loop_D3.80mm_Drill2.5mm	1	Keystone1502-2	Keystone
J8	S_VREG	TestPoint_Keystone_5005-5009_Compact	1	Keystone 5005	Keystone
J11	I2C	PinHeader_1x04_P2.54mm_Vertical	1	Header, 2.54 mm, 4x1, Gold, TH	Wurth Elektronik
J12	VPOS	TestPoint_Loop_D3.80mm_Drill2.5mm	1	Keystone1502-2	Keystone
J13	S_VPOS	TestPoint_Keystone_5005-5009_Compact	1	Keystone 5005	Keystone
J16	VNEG	TestPoint_Loop_D3.80mm_Drill2.5mm	1	Keystone1502-2	Keystone
J17	S_NEG	TestPoint_Keystone_5005-5009_Compact	1	Keystone 5005	Keystone
J20	EN	PinHeader_1x06_P2.54mm_Vertical	1	Header, 2.54 mm, 6x1, Gold, TH	Wurth Elektronik
C2 and C3 value for NEX10001UB EVM board [1]					
C2	4.7 µF	C_0603_1608Metric	1	C1608X5R1C225KTK00E	TDK
C3	10 µF	C_0603_1608Metric	1	C1608X5R1E106K080AC	TDK

[1] For NEX10001UB: Due to the output current of 220 mA, some capacitor values (C2 and C3) are different.

8. Revision history

Table 5. Revision history

Revision number	Date	Description
UM90019 v.1	20240124	Initial version

9. Legal information

Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of Nexperia.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — Nexperia products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

Contents

For more information, please visit: http://www.nexperia.com
For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 24 January 2024