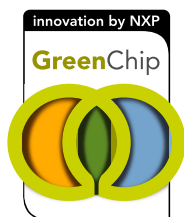# UM11925

TEA2016DK1008 programming board and development samples

Rev. 1 — 10 May 2023   **User manual**

Document Information

Information	Content
Keywords	TEA2016AATdev/2, TEA2016DK1008, RDK01DB1563, programming kit, quick start guide
Abstract	This quick start guide describes how to get started with the TEA2016DK1008 programming kit.

Revision history

Rev	Date	Description
v.1	20230510	Initial version

1   Important notice

IMPORTANT NOTICE	
	For engineering development or evaluation purposes only
	NXP provides the product under the following conditions:
	This evaluation kit is for use of ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY.
	It is provided as a sample IC pre-soldered to a printed-circuit board to make it easier to access inputs, outputs and supply terminals. This evaluation board may be used with any development system or other source of I/O signals by connecting it to the host MCU computer board via off-the-shelf cables. This evaluation board is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application heavily depends on proper printed-circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.
	The product provided may not be complete in terms of required design, marketing, and or manufacturing related protective considerations, including product safety measures typically found in the end device incorporating the product. Due to the open construction of the product, it is the responsibility of the user to take all appropriate precautions for electric discharge. In order to minimize risks associated with the customers' applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards. For any safety concerns, contact NXP sales and technical support services.

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2 Safety warnings

2.1 Open-framed, unenclosed PCB

This user manual describes the operation of the TEA20XX_SOCKET_DB1586. The TEA20XX_SOCKET_DB1586 is provided as an open-framed, unenclosed printed-circuit board (PCB) assembly.

- Use of the TEA20XX_SOCKET_DB1586 is only intended for development laboratory environments. Only qualified professionals with training, expertise, and knowledge of electrical safety risks in the development and application of high-voltage electrical circuits must use the TEA20XX_SOCKET_DB1586.
- While the TEA20XX_SOCKET_DB1586 has been designed with user safety in mind, no agency has formally tested the demo board.
- The TEA20XX_SOCKET_DB1586 is not intended for and must not be used in a production unit.

Any use beyond development and testing is strictly prohibited.

2.2 General high-voltage demo board user safety guidelines

Work area safety

- Keep the work area clean and orderly.
- One or more qualified observers must be present at any time the circuits are energized.
- Effective barriers and signage must be present in the area where the demo board and its interface electronics are energized, indicating operation of accessible high voltages may be present, for protecting inadvertent access.
- All interface circuits, power supplies, evaluation modules, instruments, meters, scopes, and other related apparatus used in a development environment exceeding 50 V (RMS)/75 V (DC) must be electrically located within a protected emergency power-off (EPO) protected power strip.
- Use a stable and non-conductive work surface.
- To attach measurement probes and instruments, use adequately insulated clamps and wires. If possible, do not perform any freehand testing.

Electrical safety

- As a precautionary measure, it is always good engineering practice to assume that the entire demo board may have fully accessible and active high voltages.
- Before performing any electrical or other diagnostic measurements, deenergize the TEA20XX_SOCKET_DB1586 and all its inputs, outputs, and electrical loads. Revalidate that the TEA20XX_SOCKET_DB1586 power has been safely deenergized.
- After confirmation that the TEA20XX_SOCKET_DB1586 has been deenergized, proceed with required electrical circuit configurations, wiring, measurement equipment hook-ups, and other application requirements, while still assuming the EVM circuit and measuring instruments are electrically live.
- When the TEA20XX_SOCKET_DB1586 readiness is complete, energize the TEA20XX_SOCKET_DB1586 as intended.

Personal safety

- Wear personal protective equipment, for example, latex gloves or safety glasses with side shields. Or protect the demo board in an adequate lucent plastic box with interlocks from accidental touch.

2.3 Safety warning

The board must be connected to mains voltage. Avoid touching the demo board while it is connected to the mains voltage. When used in uncontrolled, non-laboratory environments, an isolated housing is obligatory. Galvanic isolation of the mains phase using a variable transformer is always recommended. Figure 1 shows the symbols that identify the isolated and non-isolated devices.

019aab173

a. Isolated

019aab174

b. Not isolated

Figure 1. Isolation symbols
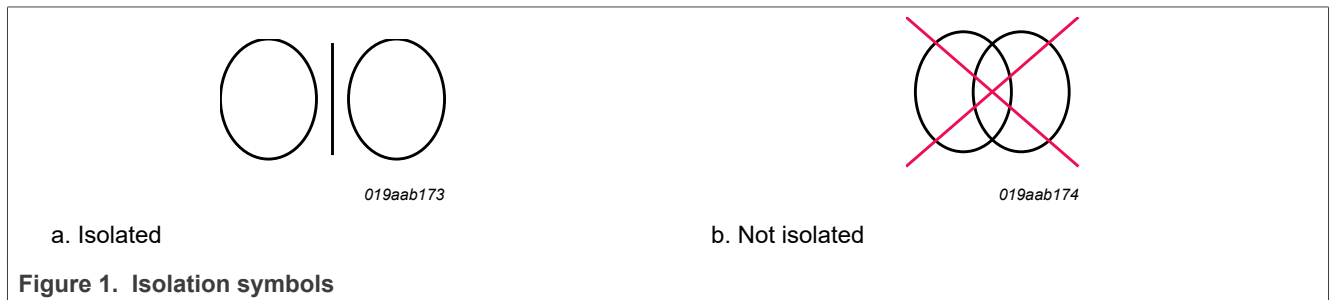
Your use of the demo board is conditioned on agreement to and compliance with the terms of use. The terms of use may be found in Section 3.

This product has not undergone formal EU EMC assessment. As a component used in a research environment, it is the responsibility of the user to ensure that the finished assembly does not cause undue interference when used. It cannot be CE marked unless assessed.

3   Introduction

Congratulations on your new TEA2016DK1008 programming kit from NXP Semiconductors, showcasing our TEA2016AATdev/2 PFC + LLC controller IC and programming board. The TEA2016/2 offers the leading solution for (computing, all-in-one PC, gaming, 4K/8K LED TVs, LED lighting, and so on) power supplies. The high level of integration of the IC allows easy design of a compact size, highly efficient and reliable power supply with a very low number of external components. A power supply using the TEA2016/2 provides a very low no-load input power (< 75 mW; total system including the TEA2016/TEA2095T combination) and high efficiency from minimum to maximum load.

Included in the box are TEA2016/2 dev samples and a TEA20xx_SOCKET_DB1586 programming board.

The guide further contains a link to product pages, user manuals, data sheets, application notes, and brochures.

To find out more, check out the TEA2016 product information page and learn more about the complete range of GreenChip solutions on the NXP website.

Best regards,

The NXP Smart Power Team

WARNING	
Lethal voltage and fire ignition hazard	
⚡ 🔥	The non-insulated high voltages that are present when operating this product, constitute a risk of electric shock, personal injury, death and/or ignition of fire. This product is intended for evaluation purposes only. It shall be operated in a designated test area by personnel qualified according to local requirements and labor laws to work with non-insulated mains voltages and high-voltage circuits. This product shall never be operated unattended.

This product has not undergone formal EU EMC assessment. As a component used in a research environment, it is not intended for use in a finished product. If used, it is the responsibility of the user to ensure that the finished assembly does not cause undue interference when used. The product cannot be CE marked unless assessed.
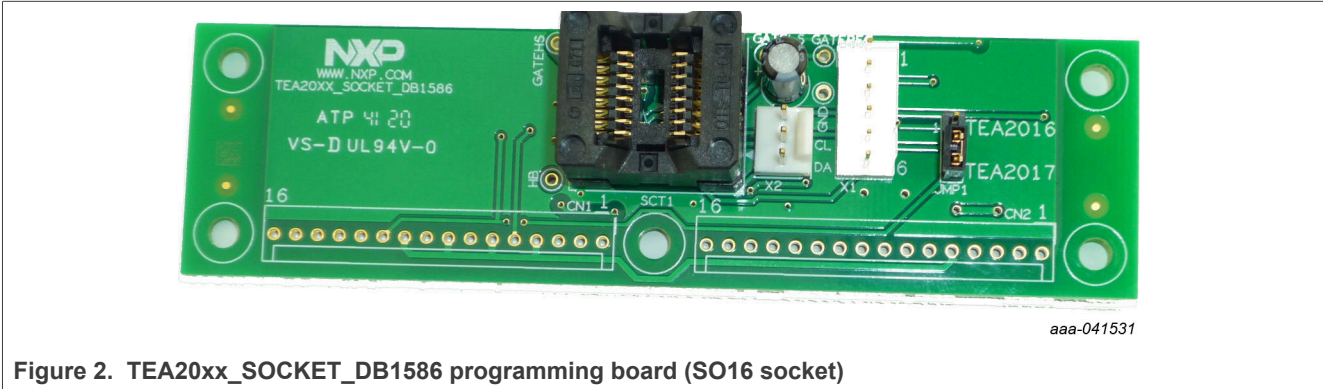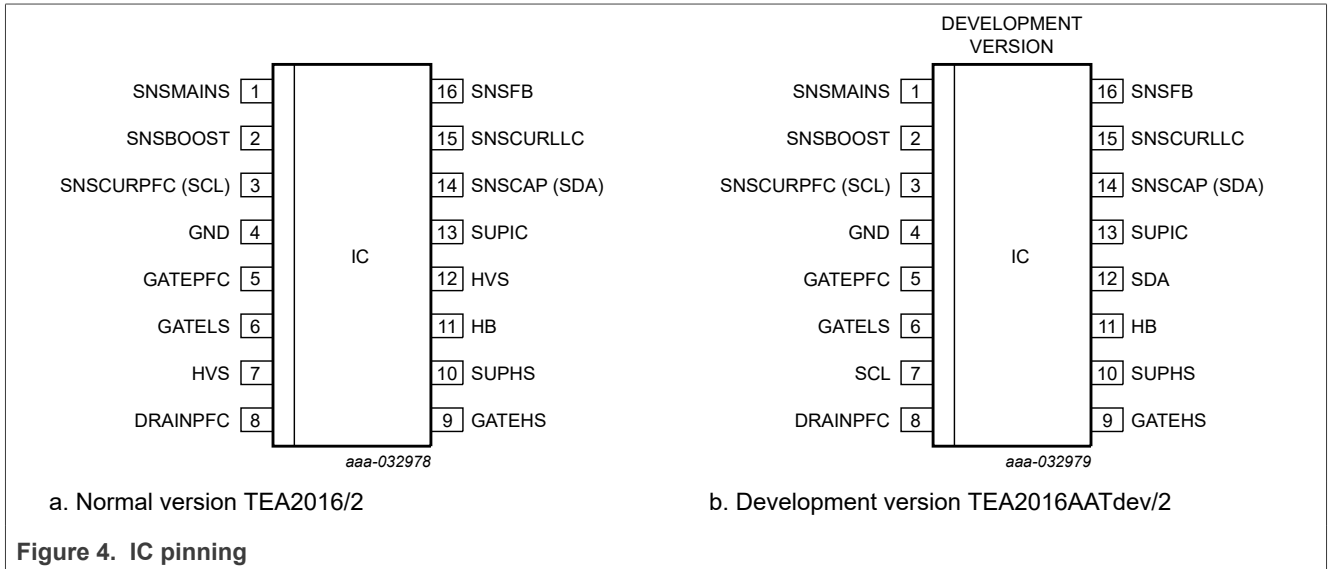
3.1 Kit content

aaa-041531

Figure 2. TEA20xx_SOCKET_DB1586 programming board (SO16 socket)

aaa-041532

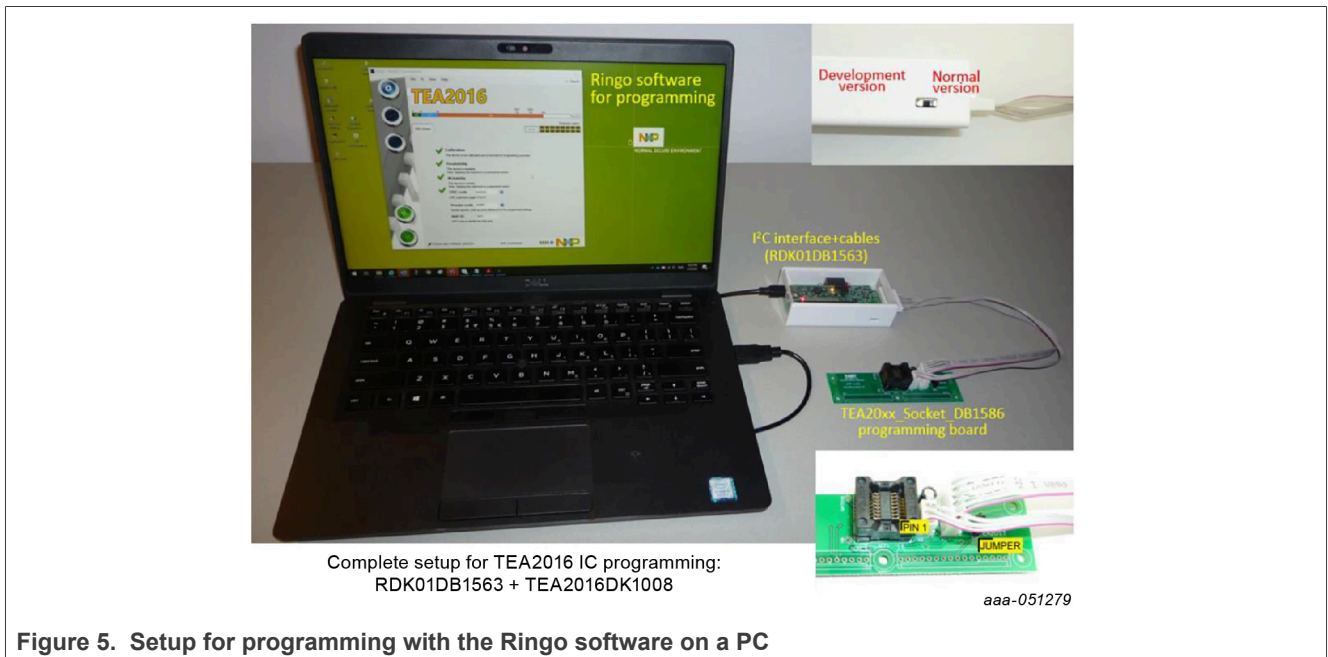**Figure 3. TEA2016AAT/2dev ICs**

4   Programming kit quick start guide

Type: TEA2016DK1008
                                    GreenChip TEA2016AATdev/2 samples and TEA20xx_Socket_DB1586 programming board.

12nc: 935454069598

Figure 4. IC pinning

Note: *For the TEA2016AATdev/2 (development) samples, the high-voltage spacer (HVS) pins (pin 7: SCL; pin 12: SDA) are used to connect directly to the I^2C interface in the IC. By connecting these pins via the TEA2016 USB I^2C interface to the PC/GUI, parameters can be programmed directly in a live application.*

Complete setup for TEA2016 IC programming:
RDK01DB1563 + TEA2016DK1008

Figure 5. Setup for programming with the Ringo software on a PC

5 Frequently asked questions

5.1 Ringo software

Q: Ringo.exe does not start.

- A1: To enable Ringo software to work, the USB-I2C interface driver (FT232) must be installed on the computer.
- A2: Ensure that you are using a compatible version: 32-bit or 64-bit.
- A3: Ringo is made for Windows operating systems. On other operating systems, use a Windows emulator to run Ringo.

Q: Can I work with Ringo without the interface connected?

- A1: Yes, when the USB-I2C interface driver (FT232) is already installed.
- A2: To get started, install the USB-I2C interface driver (FT232) on the computer to enable Ringo software to work. For the Ringo software to work, the interface must be connected (once) to install the driver.

Q: When I connect the USB-I2C interface, it does not work.

- A1: To make the FT323 module operational, a driver is required. The driver is often automatically installed (plug and play). However, sometimes, a manual install is required. Several drivers are included in the Ringo zip package. Watch the video "installing USB driver manually" on the NXP website.
- A2: When you installed the driver and it still does not work: Completely remove the driver ('delete the driver software for this device') and select another driver included. Or visit the FTDI chip website for more information or driver versions.

5.2 USB-I2C interface

Q: There is no communication with the IC.

- A1: Check if the switch on the interface is in the correct position: 3-pin or 6-pin.
- A2: Check if the correct cable is connected (or both cables when using the programming board).
- A3: Check if signal disturbance is blocking communication.

Q: I want to modify or repair on the board. Is there a circuit diagram?

- A1: The circuit diagram is included in the UM11235 user manual. This document is available in the help tab of the Ringo software.

Q: What is the function of the LEDs on the board?

- A1: The Ringo software can use them to indicate that the I2C connection is OK. The indication differs between Ringo versions. In general, slow blinking indicates no communication with the IC. And fast blinking indicates correct communication with the IC.

5.3 Programming board

Q: Which cable do I connect when I want to work with the programming board?

- A1: Connect the 3-pin and the 6-pin cables and select the correct I^2C channel for communication.
- A2: For a TEA2016AAT or TEA2016AAT/2 IC, only the 6-pin cable connection is required.
- A3: For a TEA2016AATdev or TEA2016AAT/2dev IC, the 3-pin and the 6-pin cables are required.

Q: I want to measure signals or modify the board. Is there a circuit diagram?

- A1: The circuit diagram is included in Ringo or available for download.

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Q: What is the function of the jumper JMP1?

- A1: The TEA20xx_SOCKET_DB1586 can be used for TEA2016 and TEA2017 ICs. With the jumper, the correct type can be selected, which is important for the standard (non-development) IC types to make the correct pin connections.

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