



ANR027

BLUETOOTH LISTING GUIDE

VERSION 1.2

DECEMBER 9, 2022

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

Revision history

Manual version	Notes	Date
1.0	<ul style="list-style-type: none">• Initial version	October 2021
1.1	<ul style="list-style-type: none">• Updated QDIDs for nRFConnect	March 2022
1.2	<ul style="list-style-type: none">• Added chapter 3 describing how to add a new product to an existing end product listing• Applied style of the new corporate design to the document	December 2022

Abbreviations

Abbreviation	Name	Description
ATT	Attribute Protocol	Protocol of the Bluetooth® software stack to access the GATT layer
GAP	Generic Access Profile	Layer of the Bluetooth® software stack for connection oriented tasks
GATT	Generic Attribute Profile	Layer of the Bluetooth® software stack for Bluetooth® profile definition
HCI	Host Controller Interface	Standardized interface between controller and host subsystem
L2CAP	Logical Link Control Adaptation Protocol	Protocol of the Bluetooth® software stack for Bluetooth® link related tasks
LL	Link Layer	Layer of the Bluetooth® software stack for link related tasks
PHY	Physical Layer	Layer of the Bluetooth® software stack for physical data transmission
QDID	Qualified design ID	Identifier of the qualified Bluetooth® design
SM	Security Manager Protocol	Protocol of the Bluetooth® software stack to handle security related tasks
	Soft device	Bluetooth® stack used by the nRF52 chip series

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1 Introduction

This application note gives a short overview of the Bluetooth® organization and listing in chapter 1. In chapter 2 the main focus is put on how a listing for the end device can be created when referring to Würth Elektronik eiSos Bluetooth® modules and their Bluetooth® listing.



To bring an end device into the market, national radio certifications like FCC and CE must be gained besides of the Bluetooth® listing. How to get them will not be considered in this application note.

1.1 Bluetooth organization

The Bluetooth® SIG (special interest group) is the organization that controls the development of the Bluetooth® standard, and manages the use of the Bluetooth® technology, trademarks and licenses by manufacturers.

All manufacturers that use Bluetooth® technology and trademarks need to gain a so called "Bluetooth® listing" for their products to bring them into the market. To be a member of the Bluetooth® SIG is a requirement for that. There are different types of memberships. The basic level, the so called "Adopter Membership", is free to join. More advanced memberships allow to contribute to future developments of the Bluetooth® standard, but are associated with membership fees.

1.2 Bluetooth standard

The Bluetooth® standard is defined in the Bluetooth® Core Specification [1]. There are different versions of it, where each declares its mandatory and optional features. The Bluetooth® standard is always under development, such that new versions are released and old versions are withdrawn. This means that withdrawn standards can no longer be used to gain a new listing, and thus new products using that can not enter the market.

1.3 Bluetooth listing

The Bluetooth® listing must be gained for each new product. It contains two parts, the qualification and the declaration.

The qualification basically proves that the new product complies with the Bluetooth® standard. This process ensures that the interoperability between all Bluetooth® devices is given. To gain the qualification various tests have to be performed. This includes the whole range from physical radio tests to protocol and feature tests of the underlying Bluetooth® software stack. Each tested component of a qualification process gets a so called QDID (qualified design identifier) that certifies its conformance and can be reused, when this component is used in another design.

For each product, the declaration process collects the QDIDs of the used Bluetooth® components and puts them together to the listing of the product. The number identifying the product's listing is called DID (declaration identifier). It must be purchased during the declaration process. For adopter members it's 8000\$ (9600\$ after Jan 1. 2022) [2].

1.3.1 Product types

There are several types of listings, that contain different parts of the Bluetooth® standard:

End product: A product that contains the whole Bluetooth® functionality (from physical layer to Bluetooth® software stack layers) can be listed as "end product". As it contains all Bluetooth® functions, it can operate standalone.

Any Würth Elektronik eiSos Bluetooth® radio module including firmware is listed as "end product".

Controller subsystem: A product that contains only the physical (PHY) and link layer (LL), equipped with a standardized host controller interface (HCI) can be listed as "controller subsystem". For operation, it must be combined with the complementary part that is listed as "host subsystem".

Any USB Bluetooth® dongle with HCI is listed as "controller subsystem". It runs only in combination with a personal computer hosting the Bluetooth® stack.

Host subsystem: A product that contains only the Bluetooth® stack layers can be listed as "host subsystem". For operation, it must be combined with the complementary part that is listed as "controller subsystem".

Any operating system hosting a Bluetooth® stack is listed as "host subsystem". It needs a Bluetooth® USB dongle, or any other Bluetooth® hardware with HCI listed as "controller subsystem" to provide the Bluetooth® interface to the user.

Tested component: Any other product, that contains the qualification of one or several layers, that do not meet any other product type can be listed as "Tested component".



Products listed as "end product", "controller subsystem" or "host subsystem" may enter the market.

"Tested components" can only be used to create new "end product", "controller subsystem" or "host subsystem" listings.

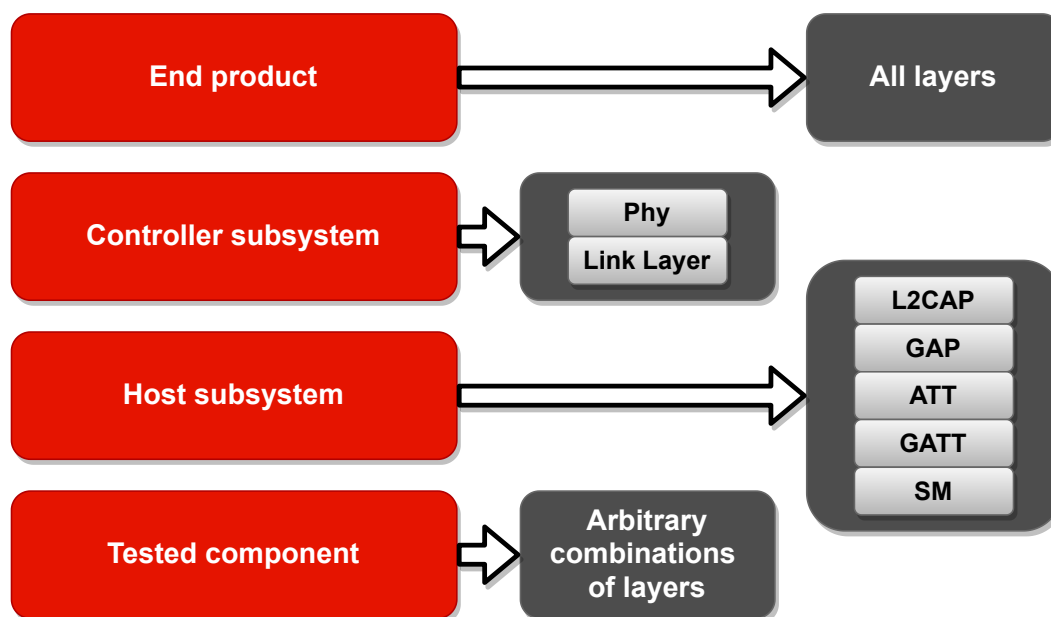


Figure 1: Product types

2 Creating a new Bluetooth listing for the end device

As Würth Elektronik eiSos Bluetooth® radio modules, the underlying radio chips and the utilized Bluetooth® software stacks are fully qualified, integrators of Würth Elektronik eiSos radio modules can refer to the existing QDIDs in the declaration process of their end device. Thus all costs for the conformity tests being part of the qualification process are saved. Left is the purchase of the declaration ID, that has to be done once to gain the "end product" listing for the end device.

Once an "end product" listing exists, new variants of the end device from the same manufacturer can be added free of charge, if no change has been applied to its hardware and software components relating to the Bluetooth® functionality.

The remaining chapter describes how to do the declaration process for an end device using a Würth Elektronik eiSos radio module.

2.1 Get a Bluetooth membership

To perform a Bluetooth® listing, you must be member of the Bluetooth® SIG. In case the registration has been already done before, jump to the next chapter.

Otherwise follow the instructions under

<https://www.bluetooth.com/develop-with-bluetooth/join/>

and apply for an adopter membership, which is free of charge. This membership is sufficient to list a device by paying the declaration fee.

2.2 Open the Bluetooth Launch Studio

The declaration process of an end device must be done via the Bluetooth® Launch Studio website:

<https://launchstudio.bluetooth.com/>

To login into the Bluetooth® Launch Studio enter the membership account credentials that you received when registering to the Bluetooth® SIG.

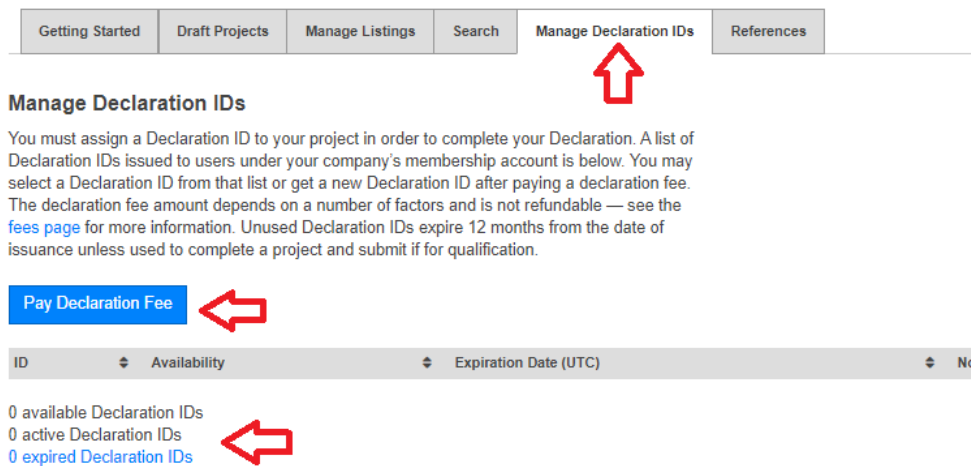
2.3 Purchase a declaration ID

In the declaration process a so called declaration ID has to be used. It has to be purchased from the Bluetooth® SIG and is only available after it has been paid.

When starting the declaration process (chapter 2.5), it is helpful to have already a declaration ID available to go through it in a row.

To do so, please go on the "Manage Declaration IDs" tab and check whether there is one available. If not, click on "Pay Declaration Fee" and purchase one (9600 \$ July 2022).

As soon as it has been paid, it appears in the list of available declaration IDs. This may take several days.



Getting Started Draft Projects Manage Listings Search **Manage Declaration IDs** References

Manage Declaration IDs

You must assign a Declaration ID to your project in order to complete your Declaration. A list of Declaration IDs issued to users under your company's membership account is below. You may select a Declaration ID from that list or get a new Declaration ID after paying a declaration fee. The declaration fee amount depends on a number of factors and is not refundable — see the [fees page](#) for more information. Unused Declaration IDs expire 12 months from the date of issuance unless used to complete a project and submit it for qualification.

[Pay Declaration Fee](#)

ID	Availability	Expiration Date (UTC)	No
0 available Declaration IDs			
0 active Declaration IDs			
0 expired Declaration IDs			

Figure 2: Check for an available declaration ID

2.4 Search for the QDID

As described above, the qualification of all parts has been already done by Würth Elektronik eiSos or the radio chip suppliers. Thus during the declaration of the end device only the QDIDs of the underlying Bluetooth® parts must be referenced.

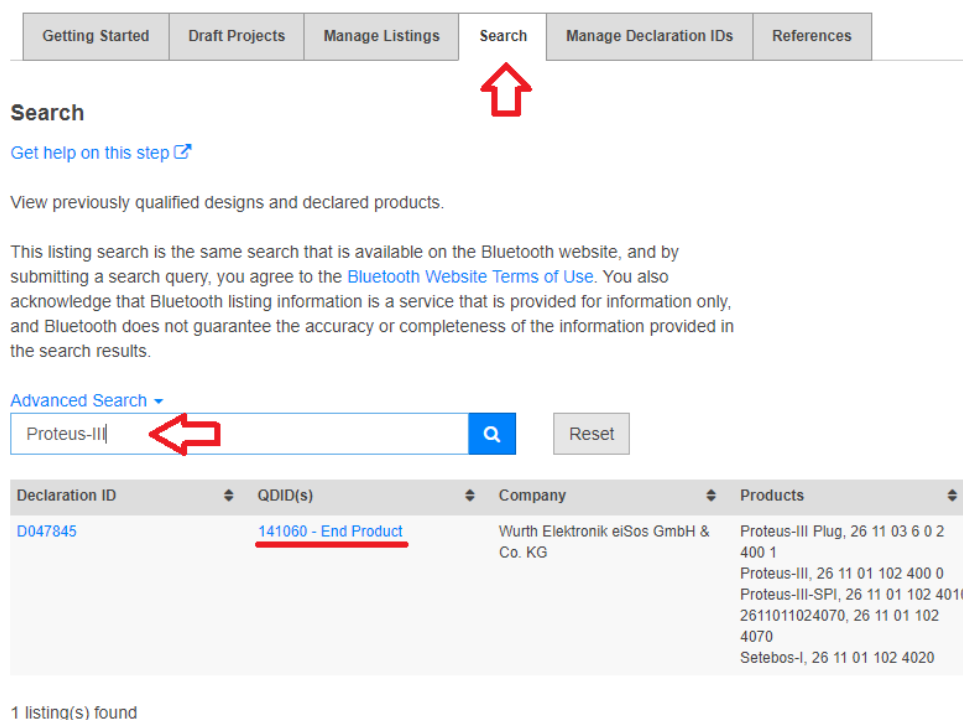
In this chapter we collect all the necessary QDIDs such that the declaration process (chapter 2.5) can be done in a row.

2.4.1 QDID of a radio module including firmware, like Proteus-III



This chapter is only valid radio modules, where the firmware provided by Würth Elektronik eiSos is not been changed in the end device by the radio module integrator. Otherwise please refer to chapter 2.4.2.

Please go to the tab "Search" and enter the radio module name into the search field to find the QDID of its "end product" listing.



Search

[Get help on this step](#)

View previously qualified designs and declared products.

This listing search is the same search that is available on the Bluetooth website, and by submitting a search query, you agree to the [Bluetooth Website Terms of Use](#). You also acknowledge that Bluetooth listing information is a service that is provided for information only, and Bluetooth does not guarantee the accuracy or completeness of the information provided in the search results.

Advanced Search

Proteus-III

Reset

Declaration ID	QDID(s)	Company	Products
D047845	<u>141060 - End Product</u>	Würth Elektronik eiSos GmbH & Co. KG	Proteus-III Plug, 26 11 03 6 0 2 400 1 Proteus-III, 26 11 01 102 400 0 Proteus-III-SPI, 26 11 01 102 4010 2611011024070, 26 11 01 102 4070 Setebos-I, 26 11 01 102 4020

1 listing(s) found

Figure 3: Search for the QDID of Würth Elektronik eiSos radio modules with firmware

Article number	Module name	Type	QDID
2608011024000, 2608011124000	Proteus-I (AMB2621)	End product	90212
2608011024010, 2608011124010	Proteus-II	End product	118943
2611011024000, 2611011024010	Proteus-III, Proteus-III-SPI	End product	141060
2612011024000	Proteus-e	End product	177585

Table 1: Radio module end product QDIDs

This is the only QDID that is needed when a Würth Elektronik eiSos radio module is used, that includes firmware.

2.4.2 QDID of a radio module custom firmware, like Ophelia-I



This chapter is only valid radio modules, where the radio module firmware has not been provided by Würth Elektronik eiSos.

In case the module integrator will flash a Bluetooth® software stack on the radio module, Würth Elektronik eiSos can not list the module as "end product", as it does not contain all Bluetooth® components at the time it has been sold.

To get the "end product" listing of the end device, the QDIDs of the components of the radio chip and the chosen Bluetooth® software stack must be taken instead.

Here the goal is to combine the "controller subsystem" listing of the radio chip and the "host subsystem" listing of the Bluetooth® software stack to one "end product" listing.



Alternatively, the controller subsystem listing of the radio chip can be replaced by its "tested component" listings of the PHY, and link layers (LL) and the HCI.



Alternatively, the host subsystem listing of the Bluetooth® software stack can be replaced by its "tested component" listings of the L2CAP, GAP, ATT, GATT and SM layers.



In case "tested component" listings are used instead of a "subsystem" listing, no retest is required if the "tested component" listing is younger than 3 years. In case a listing of a "tested component" to be referred to is older, a retest of this component must be done first!

2.4.2.1 Search for the QDID of the radio chip

To do so, please go to the tab "Search", click on "Advanced Search", select "Controller Subsystem" and enter the provider of the radio chip.

Article number	Module name	Radio chip	Controller subsystem QDID
2608011024000, 2608011124000	Proteus-I (AMB2621)	Nordic Semiconductor nRF52832	170216
2608011024010, 2608011124010	Proteus-II	Nordic Semiconductor nRF52832	170216
2611011024000, 2611011024010	Proteus-III, Proteus-III-SPI	Nordic Semiconductor nRF52840	170216
2612011024000	Proteus-e	Nordic Semiconductor nRF52805	170216
2612011022000	Ophelia-I	Nordic Semiconductor nRF52805	170216

Table 2: Bluetooth® radio chips


Take the newest entry that matches to the underlying radio chip.

Getting Started Draft Projects Manage Listings **Search** Manage Declaration IDs References

Search
Get help on this step [↗](#)

View previously qualified designs and declared products.


This listing search is the same search that is available on the Bluetooth website, and by submitting a search query, you agree to the [Bluetooth Website Terms of Use](#). You also acknowledge that Bluetooth listing information is a service that is provided for information only, and Bluetooth does not guarantee the accuracy or completeness of the information provided in the search results.

Advanced Search 

Search By Project Type


☒ Qualifications With Required Testing
☒ Qualifications With No Required Testing
☐ End Product Listings (EPLs < 2/1/2014)
☐ Qualified Product Listings (PRD 1.0)

Company

Nordic Semiconductor ASA 

☐ My Company

Product Type

Controller Subsystem 

Spec Name



NONE

Listing Date

From: YYYY-MM-DD
To: YYYY-MM-DD

Layers:

☐ 3DSP
☐ 4.0HCI
☐ 80211 MAC-PHY
☐ 80211PAL
☐ A2DP
☐ A2MP
☐ AICS
☐ AIOP

Search...  



Declaration ID	QDID(s)	Company	Products	Specification Name
D052396	<u>170216 - Controller Subsystem</u>	Nordic Semiconductor ASA	SoftDevice Controller Subsystem for nRF52, NCS tag 1.6.0 SoftDevice Controller Subsystem for nRF52, NCS tag 1.7.0	5.2 
D052395	170219 - Controller Subsystem	Nordic Semiconductor ASA	SoftDevice Controller Subsystem for nRF53, NCS tag 1.6.0	5.2 

Figure 4: Search for the QDID of the radio chip

2.4.2.2 Search for the QDID of the Bluetooth® software stack

Do the same for the Bluetooth® software stack by entering

- either "host subsystem" in the product type field
- or "tested component" in the product type field and search for "host layer tested component" listings in the search results.

Take the QDID that matches the chosen Bluetooth® software stack.

Advanced Search ▾

Search By Project Type

☒ Qualifications With Required Testing

☒ Qualifications With No Required Testing

☐ End Product Listings (EPLs < 2/1/2014)

☐ Qualified Product Listings (PRD 1.0)

Company

Nordic Semiconductor ASA

☐ My Company

Product Type

Host Subsystem

Spec Name

NONE

Listing Date

From: YYYY-MM-DD

To: YYYY-MM-DD

Layers:

☐ 3DSP

☐ 4.0HCI

☐ 80211 MAC-PHY



☐ 80211PAL

☐ A2DP

☐ A2MP

☐ AICS

☐ AIOP

Search...  

Declaration ID	QDID(s)	Company	Products	Specification Name	Listing Date
D047614	157450 - Host Subsystem	Nordic Semiconductor ASA	nRF Connect SDK Host Subsystem, Host Subsystem for 1.4.1 nRF Connect SDK Host Subsystem, Host Subsystem for 1.5.x nRF Connect SDK Host Subsystem, Host Subsystem for 1.6.0	5.2	2020-11-18
D043346	136227 - Component (Tested)	Nordic Semiconductor ASA	Host Layer for S140 SoftDevice, nRF52 Host 7.0.1 S132 Host Layer subset for SD 7.0.1, S132 Host 7.0.1 S112 Host Layer subset for SD 7.0.1, S112 Host 7.0.1 S113 Host Layer subset for SD 7.0.1, S113 Host 7.0.1	5.1	2019-08-30
D038371	122684 - Component (Tested)	Nordic Semiconductor ASA	Host Layer for S140 SoftDevice, nRF52 Host v6.1.1 Host layer for S132 SoftDevice, nRF52 Host v6.1.1 S112 Host Layer Subset, nRF52 Host v6.1.1	5.0	2019-01-24

Figure 5: Search for the QDID of the Bluetooth® software stack

Bluetooth® stack	Type	QDID
nRFConnect SDK 1.4.1, 1.5.x, 1.6.0	Host subsystem	157450
nRFConnect SDK 1.7.0, 1.7.1, 1.8.0	Host subsystem	176697
S112, S113, S132, S140 V7.x.x Host layers	Tested component	136227
S112, S132, S140 V6.x.x Host layers	Tested component	122684

Table 3: Bluetooth® software stacks

Using the QDIDs of the radio chip and the Bluetooth® software stack, the declaration process can start.

2.5 Run the declaration process

To start the declaration process go to the tab "Getting started" and click on "Start the Bluetooth Qualification Process with No Required Testing".

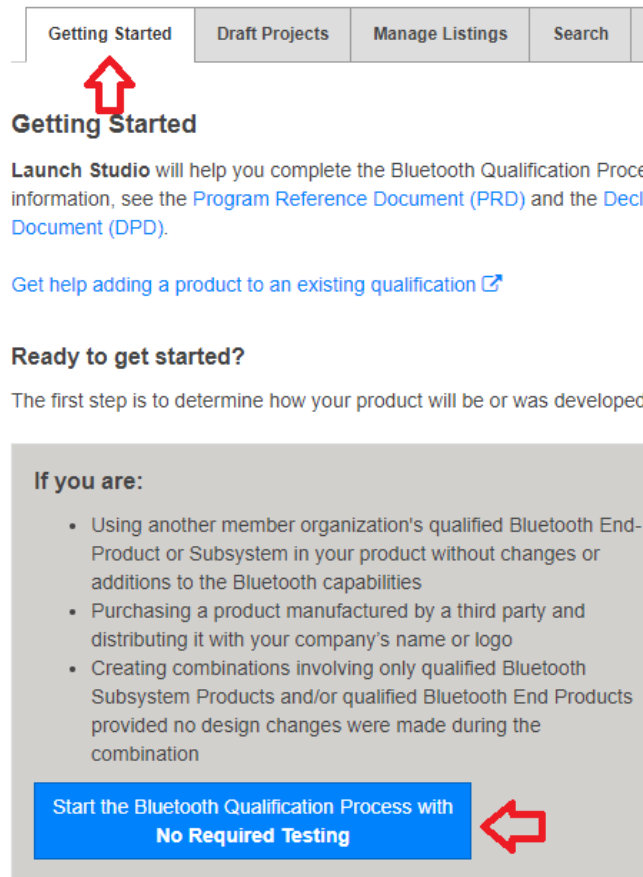


Figure 6: Start the declaration process

Then enter the project name, that shall contain the listing of one or several end devices including the same Bluetooth® components. As described before, several products can be collected under the same listing, if all products are from the same manufacturer and have the same Bluetooth® components (hardware as well as software). Additional products can be also added later to an existing listing must not be done now.

Next, enter the QDIDs of the Bluetooth® components to refer to. In case you are referring to a Würth Elektronik eiSos radio module with firmware, enter the QDID of the module's end product listing (see chapter 2.4.1). In case you are referring to a Würth Elektronik eiSos radio module without firmware, enter the QDIDs of the radio chip and the Bluetooth® software stack, subsequently (see chapter 2.4.2).

If all QDIDs have been added, click on "Save and continue to Product Declaration".

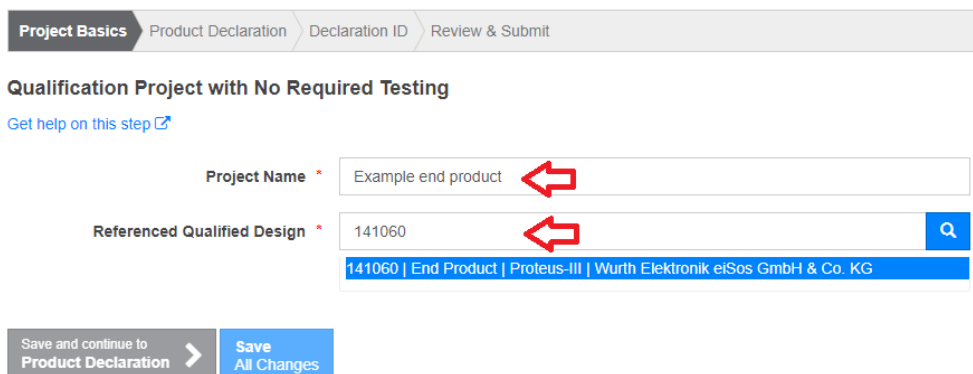


Figure 7: Project basics: Example design referring to Proteus-III radio module

Then enter the listing date and click on "Add a product".

Project Basics
Product Declaration
Declaration ID
Review & Submit

Product Declaration

Begin the Declaration Process phase of product qualification by describing each of your product(s) that implement Bluetooth technology.

[Get help on this step](#)

Listing Date *

Product Listing

List all Products that use this Design (or combination of Designs) and that are distributed under a name that identifies your company as the source of the Product. Please refer to the [Bluetooth Launch Studio Terms of Use](#) for the definition of "Product." Color variations are not considered as separate Product. Any other change (e.g., form factor, model name, Design, etc.) is considered a separate Product. All Products must complete the Qualification Process by adding a separate Product listing. Certain changes to the Design portion of a Product will require a new Design qualification and Declaration ID (as set forth in the [Bluetooth Qualification Program Reference Document \(PRD\)](#)).

Bluetooth SIG maintains a publicly available database of information submitted through Launch Studio. Customs officials often use the database to identify unlicensed Bluetooth products. If a product implements Bluetooth technology or bears the Bluetooth® trademark and it is not listed in Bluetooth SIG's database, customs officials may seize or block the import of the product. You can delay the inclusion of certain information about your product in the publicly available database for up to 90 days after you submit your product (see Bluetooth Launch Studio Terms of Use, Section 5) by selecting a Publish Date in the "Add a Product" modal up to 90 days after the date you submit your product.

Add a Product
Import Products

Product Name	Product Website	Product Category	Publish Date

Save and return to Project Basics
Save and continue to Declaration ID
Save All Changes

Figure 8: Product declaration

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Fill this form for the end device that shall be part of the listing. In case of several end devices, repeat this step. Please note that all end devices collected under the same listing must contain the same Bluetooth® components (from physical layer to Bluetooth® software stack layers).

Add/Edit products

×

Product Full Name *

(Including Trademark)

Example end device

Category

Select a Category

▼

Product Website

Publish Date *

2022-01-01

Certain product information becomes visible to the public in Bluetooth SIG's database at 00:00 UTC±00:00 Coordinated Universal Time (UTC) on the Publish Date you select. The Publish Date must be on or after the Listing Date, but no later than 90 days from the date this product is submitted.

Description *

Description of the end device

Model Number *

Model number of the end device

Cancel

Save

Figure 9: Product information

Save the inserted product information and continue by clicking on "Save and continue to Declaration ID".

In case you already bought an declaration ID, select it in the list of available declaration IDs. Otherwise click on "Pay Declaration Fee" to purchase one.



Please note that purchased declaration IDs show up in the list of available declaration IDs not before it has been paid.

Example end product

Project Basics

Product Declaration

Declaration ID


Review & Submit

Declaration IDs

Assign a Declaration ID

You must assign a Declaration ID to your project in order to complete the qualification process. A list of your available Declaration IDs is below. You may select a Declaration ID from that list or get a new Declaration ID by paying a declaration fee. The declaration fee amount depends on a number of factors and is not refundable — see the [fees page](#) for more information. Unused Declaration IDs expire 12 months from the date of issuance unless used to complete a project and submit it for qualification.

Pay Declaration Fee



[Manage my company's Declaration IDs](#)

Available Declaration IDs

ID	Expiration Date (UTC)	Notes
<input checked="" type="radio"/> None		

< Save and return to Product Declaration

Save and continue to Review >

Save All Changes

Figure 10: Declaration ID

After the declaration ID has been selected, go on by clicking on "Save and continue to Review". On the last review page, all informations are summarized to review its correctness. In case it is correct, submit the declaration for listing.

3 Add a new product to a Bluetooth listing of an existing product

The Bluetooth® SIG allows to collect several products of a product family under a single listing. In other words, when a product has been listed, other variants of the product can be added to the listing, free of charge, if the following requirements¹ are fulfilled:

1. The new product and the already listed product have the same manufacturer.
2. The new product and the already listed product use the same Bluetooth® components. Bluetooth® components are all parts of Bluetooth® software and hardware, that are collected under the QDID of the existing listing.

To start this process, open the Bluetooth® Launch Studio under <https://launchstudio.bluetooth.com/> and open the existing listing by clicking on the design name.

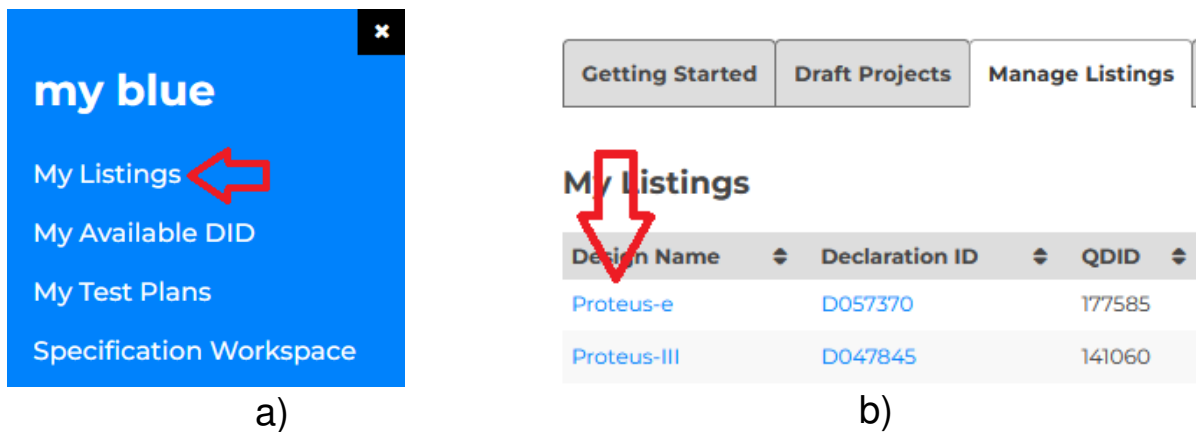


Figure 11: Open existing listing

A new window opens, showing all the listing details. Go on as shown in figure 12.

¹Source: "Bluetooth® Qualification Program Reference Document (PRD)", Chapter: "Listing Requirements", Date: December 2022

Declaration Details

✓ Project has been reviewed and a

+ Create a Subset

Listing Details

Declaration ID

Referenced Qualified Designs

Company

Membership Status

Declared by

Submit Date

Listing Date

Specification Name

Wi-Fi Certification ID

Reference Integration Notes (RIN)

SDoC/DoC

Product List

Add a Product

Product Name	Product Website

a)

Listing Date: 2019-10-28

Add a Product Import Products

Product Name	Product Website

Continue to
Review & Submit

b)

Add/Edit products

Product Full Name (Including Trademark)

new product name

Category

Select a Category

Product Website

Publish Date

2022-12-08

Certain product information becomes visible to the public in Bluetooth SIG's database at 00:00 UTC±00:00 Coordinated Universal Time (UTC) on the Publish Date you select. The Publish Date must be on or after the Listing Date, but no later than 90 days from the date this product is submitted.

Description

description of the new product

Model Number

model number of the new product

Subset ID

Cancel

Save

c)

Figure 12: Add a product

After clicking on "Save", the product details has been added. Now click on "Submit" on the bottom of the page to go to the last page. With the signature on the final page, you sign, amongst others, that the new product has the same manufacturer and the new product uses the same qualified design (same Bluetooth® components) as the existing product.

Complete and Submit Product(s) for Qualification

By typing my name or other symbol of my signature into the "Signature" field below, I agree on behalf of Wurth Elektronik eiSos GmbH & Co. KG ("Company") to the [Bluetooth Launch Studio Terms of Use](#), and I make the following representations and warranties personally and on behalf of Company.

- ☒ I am authorized by Company to submit all of the information and materials included in this project and all information and materials are true, complete, and accurate.
- ☒ Company does not, by its governing documents or other applicable law, require more than one signatory, a stamp or seal, or a witnessed signature to be legally bound.
- ☒ I agree on behalf of Company to contract in English and electronically, and adopt the characters and symbols input in the signature field below as my signature, with the same effect as an ink signature.
- ☒ The products included in this project are owned by Company and, if marketed or distributed, are done so under a name that uniquely identifies Company as the source of the Product.
- ☒ The product(s) included in this project and the corresponding Qualified Designs comply with the [Bluetooth Launch Studio Terms of Use](#) and the versions of the Bluetooth Specifications referenced in the project.

If any of the foregoing is not correct or you do not agree, you must exit this form without signing.

Signature:

Exit without saving

Signature Confirmed – Complete Project & Submit Additional Product(s) for Qualification



Figure 13: Signature

As soon as the "Signature Confirmed" button has been clicked, the new product is listed.

4 References

- [1] Bluetooth. Bluetooth Core Specifications. <https://www.bluetooth.com/specifications/bluetooth-core-specification/>.
- [2] Bluetooth. Bluetooth declaration fees. <https://www.bluetooth.com/develop-with-bluetooth/qualification-listing/qualification-listing-fees/>.

5 Important notes

The following conditions apply to all goods within the wireless connectivity product range of Würth Elektronik eiSos GmbH & Co. KG:

5.1 General customer responsibility

Some goods within the product range of Würth Elektronik eiSos GmbH & Co. KG contain statements regarding general suitability for certain application areas. These statements about suitability are based on our knowledge and experience of typical requirements concerning the areas, serve as general guidance and cannot be estimated as binding statements about the suitability for a customer application. The responsibility for the applicability and use in a particular customer design is always solely within the authority of the customer. Due to this fact, it is up to the customer to evaluate, where appropriate to investigate and to decide whether the device with the specific product characteristics described in the product specification is valid and suitable for the respective customer application or not. Accordingly, the customer is cautioned to verify that the documentation is current before placing orders.

5.2 Customer responsibility related to specific, in particular safety-relevant applications

It has to be clearly pointed out that the possibility of a malfunction of electronic components or failure before the end of the usual lifetime cannot be completely eliminated in the current state of the art, even if the products are operated within the range of the specifications. The same statement is valid for all software sourcecode and firmware parts contained in or used with or for products in the wireless connectivity and sensor product range of Würth Elektronik eiSos GmbH & Co. KG. In certain customer applications requiring a high level of safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health, it must be ensured by most advanced technological aid of suitable design of the customer application that no injury or damage is caused to third parties in the event of malfunction or failure of an electronic component.

5.3 Best care and attention

Any product-specific data sheets, manuals, application notes, PCN's, warnings and cautions must be strictly observed in the most recent versions and matching to the products firmware revisions. This documents can be downloaded from the product specific sections on the wireless connectivity homepage.

5.4 Customer support for product specifications

Some products within the product range may contain substances, which are subject to restrictions in certain jurisdictions in order to serve specific technical requirements. Necessary information is available on request. In this case, the field sales engineer or the internal sales person in charge should be contacted who will be happy to support in this matter.

5.5 Product improvements

Due to constant product improvement, product specifications may change from time to time. As a standard reporting procedure of the Product Change Notification (PCN) according to the JEDEC-Standard, we inform about major changes. In case of further queries regarding the PCN, the field sales engineer, the internal sales person or the technical support team in charge should be contacted. The basic responsibility of the customer as per section 5.1 and 5.2 remains unaffected. All wireless connectivity module driver software "wireless connectivity SDK" and its source codes as well as all PC software tools are not subject to the Product Change Notification information process.

5.6 Product life cycle

Due to technical progress and economical evaluation we also reserve the right to discontinue production and delivery of products. As a standard reporting procedure of the Product Termination Notification (PTN) according to the JEDEC-Standard we will inform at an early stage about inevitable product discontinuance. According to this, we cannot ensure that all products within our product range will always be available. Therefore, it needs to be verified with the field sales engineer or the internal sales person in charge about the current product availability expectancy before or when the product for application design-in disposal is considered. The approach named above does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

5.7 Property rights

All the rights for contractual products produced by Würth Elektronik eiSos GmbH & Co. KG on the basis of ideas, development contracts as well as models or templates that are subject to copyright, patent or commercial protection supplied to the customer will remain with Würth Elektronik eiSos GmbH & Co. KG. Würth Elektronik eiSos GmbH & Co. KG does not warrant or represent that any license, either expressed or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, application, or process in which Würth Elektronik eiSos GmbH & Co. KG components or services are used.

5.8 General terms and conditions

Unless otherwise agreed in individual contracts, all orders are subject to the current version of the "General Terms and Conditions of Würth Elektronik eiSos Group", last version available at www.we-online.com.

6 Legal notice

6.1 Exclusion of liability

Würth Elektronik eiSos GmbH & Co. KG considers the information in this document to be correct at the time of publication. However, Würth Elektronik eiSos GmbH & Co. KG reserves the right to modify the information such as technical specifications or functions of its products or discontinue the production of these products or the support of one of these products without any written announcement or notification to customers. The customer must make sure that the information used corresponds to the latest published information. Würth Elektronik eiSos GmbH & Co. KG does not assume any liability for the use of its products. Würth Elektronik eiSos GmbH & Co. KG does not grant licenses for its patent rights or for any other of its intellectual property rights or third-party rights.

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6.2 Suitability in customer applications

The customer bears the responsibility for compliance of systems or units, in which Würth Elektronik eiSos GmbH & Co. KG products are integrated, with applicable legal regulations. Customer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of Würth Elektronik eiSos GmbH & Co. KG components in its applications, notwithstanding any applications-related information or support that may be provided by Würth Elektronik eiSos GmbH & Co. KG. Customer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences lessen the likelihood of failures that might cause harm and take appropriate remedial actions. The customer will fully indemnify Würth Elektronik eiSos GmbH & Co. KG and its representatives against any damages arising out of the use of any Würth Elektronik eiSos GmbH & Co. KG components in safety-critical applications.

6.3 Trademarks

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6.4 Usage restriction

Würth Elektronik eiSos GmbH & Co. KG products have been designed and developed for usage in general electronic equipment only. This product is not authorized for use in equipment

where a higher safety standard and reliability standard is especially required or where a failure of the product is reasonably expected to cause severe personal injury or death, unless the parties have executed an agreement specifically governing such use. Moreover, Würth Elektronik eiSos GmbH & Co. KG products are neither designed nor intended for use in areas such as military, aerospace, aviation, nuclear control, submarine, transportation (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. Würth Elektronik eiSos GmbH & Co. KG must be informed about the intent of such usage before the design-in stage. In addition, sufficient reliability evaluation checks for safety must be performed on every electronic component, which is used in electrical circuits that require high safety and reliability function or performance. By using Würth Elektronik eiSos GmbH & Co. KG products, the customer agrees to these terms and conditions.

7 License terms

This License Terms will take effect upon the purchase and usage of the Würth Elektronik eiSos GmbH & Co. KG wireless connectivity products. You hereby agree that this license terms is applicable to the product and the incorporated software, firmware and source codes (collectively, "Software") made available by Würth Elektronik eiSos in any form, including but not limited to binary, executable or source code form.

The software included in any Würth Elektronik eiSos wireless connectivity product is purchased to you on the condition that you accept the terms and conditions of this license terms. You agree to comply with all provisions under this license terms.

7.1 Limited license

Würth Elektronik eiSos hereby grants you a limited, non-exclusive, non-transferable and royalty-free license to use the software and under the conditions that will be set forth in this license terms. You are free to use the provided Software only in connection with one of the products from Würth Elektronik eiSos to the extent described in this license terms. You are entitled to change or alter the source code for the sole purpose of creating an application embedding the Würth Elektronik eiSos wireless connectivity product. The transfer of the source code to third parties is allowed to the sole extent that the source code is used by such third parties in connection with our product or another hardware provided by Würth Elektronik eiSos under strict adherence of this license terms. Würth Elektronik eiSos will not assume any liability for the usage of the incorporated software and the source code. You are not entitled to transfer the source code in any form to third parties without prior written consent of Würth Elektronik eiSos.

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7.2 Usage and obligations

The responsibility for the applicability and use of the Würth Elektronik eiSos wireless connectivity product with the incorporated Firmware in a particular customer design is always solely within the authority of the customer. Due to this fact, it is up to you to evaluate and investigate, where appropriate, and to decide whether the device with the specific product characteristics described in the product specification is valid and suitable for your respective application or not.

You are responsible for using the Würth Elektronik eiSos wireless connectivity product with the incorporated Firmware in compliance with all applicable product liability and product safety laws. You acknowledge to minimize the risk of loss and harm to individuals and bear the risk for failure leading to personal injury or death due to your usage of the product.

Würth Elektronik eiSos' products with the incorporated Firmware are not authorized for use in safety-critical applications, or where a failure of the product is reasonably expected to cause severe personal injury or death. Moreover, Würth Elektronik eiSos' products with the incorporated Firmware are neither designed nor intended for use in areas such as military, aerospace, aviation, nuclear control, submarine, transportation (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. You

shall inform Würth Elektronik eiSos about the intent of such usage before design-in stage. In certain customer applications requiring a very high level of safety and in which the malfunction or failure of an electronic component could endanger human life or health, you must ensure to have all necessary expertise in the safety and regulatory ramifications of your applications. You acknowledge and agree that you are solely responsible for all legal, regulatory and safety-related requirements concerning your products and any use of Würth Elektronik eiSos' products with the incorporated Firmware in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by Würth Elektronik eiSos. **YOU SHALL INDEMNIFY WÜRTH ELEKTRONIK EISOS AGAINST ANY DAMAGES ARISING OUT OF THE USE OF WÜRTH ELEKTRONIK EISOS' PRODUCTS WITH THE INCORPORATED FIRMWARE IN SUCH SAFETY-CRITICAL APPLICATIONS.**

7.3 Ownership

The incorporated Firmware created by Würth Elektronik eiSos is and will remain the exclusive property of Würth Elektronik eiSos.

7.4 Firmware update(s)

You have the opportunity to request the current and actual Firmware for a bought wireless connectivity Product within the time of warranty. However, Würth Elektronik eiSos has no obligation to update a modules firmware in their production facilities, but can offer this as a service on request. The upload of firmware updates falls within your responsibility, e.g. via ACC or another software for firmware updates. Firmware updates will not be communicated automatically. It is within your responsibility to check the current version of a firmware in the latest version of the product manual on our website. The revision table in the product manual provides all necessary information about firmware updates. There is no right to be provided with binary files, so called "Firmware images", those could be flashed through JTAG, SWD, Spi-Bi-Wire, SPI or similar interfaces.

7.5 Disclaimer of warranty

THE FIRMWARE IS PROVIDED "AS IS". YOU ACKNOWLEDGE THAT WÜRTH ELEKTRONIK EISOS MAKES NO REPRESENTATIONS AND WARRANTIES OF ANY KIND RELATED TO, BUT NOT LIMITED TO THE NON-INFRINGEMENT OF THIRD PARTIES' INTELLECTUAL PROPERTY RIGHTS OR THE MERCHANTABILITY OR FITNESS FOR YOUR INTENDED PURPOSE OR USAGE. WÜRTH ELEKTRONIK EISOS DOES NOT WARRANT OR REPRESENT THAT ANY LICENSE, EITHER EXPRESS OR IMPLIED, IS GRANTED UNDER ANY PATENT RIGHT, COPYRIGHT, MASK WORK RIGHT, OR OTHER INTELLECTUAL PROPERTY RIGHT RELATING TO ANY COMBINATION, MACHINE, OR PROCESS IN WHICH THE WÜRTH ELEKTRONIK EISOS' PRODUCT WITH THE INCORPORATED FIRMWARE IS USED. INFORMATION PUBLISHED BY WÜRTH ELEKTRONIK EISOS REGARDING THIRD-PARTY PRODUCTS OR SERVICES DOES NOT CONSTITUTE A LICENSE FROM WÜRTH ELEKTRONIK EISOS TO USE SUCH PRODUCTS OR SERVICES OR A WARRANTY OR ENDORSEMENT THEREOF.

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Any liability not expressly provided by Würth Elektronik eiSos shall be disclaimed.

You agree to hold us harmless from any third-party claims related to your usage of the Würth Elektronik eiSos' products with the incorporated Firmware, software and source code. Würth Elektronik eiSos disclaims any liability for any alteration, development created by you or your customers as well as for any combination with other products.

7.7 Applicable law and jurisdiction

Applicable law to this license terms shall be the laws of the Federal Republic of Germany. Any dispute, claim or controversy arising out of or relating to this license terms shall be resolved and finally settled by the court competent for the location of Würth Elektronik eiSos' registered office.

7.8 Severability clause

If a provision of this license terms is or becomes invalid, unenforceable or null and void, this shall not affect the remaining provisions of the terms. The parties shall replace any such provisions with new valid provisions that most closely approximate the purpose of the terms.

7.9 Miscellaneous

Würth Elektronik eiSos reserves the right at any time to change this terms at its own discretion. It is your responsibility to check at Würth Elektronik eiSos homepage for any updates. Your continued usage of the products will be deemed as the acceptance of the change.

We recommend you to be updated about the status of new firmware and software, which is available on our website or in our data sheet and manual, and to implement new software in your device where appropriate.

By ordering a wireless connectivity product, you accept this license terms in all terms.

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