Instruction

QFN Certification Form

Document No.:	INS12202
Version:	5
Description:	-
Written By:	DKING;BBR;NTJ;DJOHANSEN
Date:	
Reviewed By:	BBR;DKING;OPP;PNI;NTJ;LNEO;GQUAT;SAMBAT
Restrictions:	Partners Only

Approved by:

CONFIDENTIAL

REVISION RECORD

Doc. Ver.	Date	By	Pages affected	Brief description of changes
1	20121203	DKING	ALL	Initial version/release
2	20130319	DKING	Section 3.5 Section 3.6 Section 4 Section 4.1	Deleted Japan 951MHz option Added address for Copenhagen facility Added Compliance statement and legend for tables Deleted options for Japan 951MHz frequency
4	20150527	DKING	All	Updated text for general corrections, clarifications and to add the 500 series ASCIS
4	20150503	DJohansen	Section 4 Section 3.6	Completely redid the section with new requirements and accompanying text. Changed address from Copenhagen to Singapore office
5	20150617	DKING	Section 3.6 B.1.3	Added requirement that test samples must be calibrated Corrected spec for crystal accuracy from 2% to 5%
6	20180305	BBR	All	Added Silicon Labs template

Table of Contents

1 ABBREVIATIONS

Abbreviation	Explanation

2 INTRODUCTION

2.1 Purpose

This document is the QFN certification form. The QFN certification form is used for certification of customer product/modules where the SD3502 [2] or SD3503 [3] is used in the design. This form contains a description, instructions and results of all the tests done for a QFN certification.

2.2 Audience and prerequisites

The audience of this document is Z-Wave partners developing products based on the SD3502 [2] and/or SD3503 [3] QFN.

3 Z-WAVE QFN CERTIFICATION FORM

3.1 Company information:

Company: _____

Street: _____

City, State (Province): _____

ZIP (Postal Code): _____

Country: _____

Certification Contact:

Name: _____

Title: _____

E-mail address: _____

Telephone: _____

3.2 Invoicing of Certification Fees

A Purchase Order must be issued to the appropriate Silicon Labs business unit shown below. The case number must be referenced in the PO. A corresponding invoice will be issued upon receipt of the PO. Payment details will be provided by Silicon Labs.

E-mail: Please send a signed Purchase Order in PDF format and any additional information required by your company to the appropriate e-mail address shown below. .

Billing/Vendor address:

North, Central & South America:

Silicon Labs

Attn: Z-Wave Sales

1778 McCarthy Blvd.

Milpitas, CA 95035

After July 6, 2015:

47467 Fremont Boulevard

Fremont, California 94538

USA

e-mail: : Aida_Hubbard@sigmadesigns.com

All Other Regions:

Silicon Labs Technology Singapore Pte Ltd

No. 5 Harper Road

#03-01

Singapore 369673

e-mail: CS-TW@sigmadesigns.com

3.2.1 Fees related to certification

All expenses associated with testing the device are paid by the customer. This includes the transaction fee for money transfers, packaging and shipping products to and from test facility as well as any other related expenses, e.g. flashing of new software or any other HW or SW changes requested by customer.

Fees for QFN certifications are identified on line item 4 of INS12578 Certification Fee Schedule available for download from the technical services website.

3.2.2 Payment terms

Pre-payment will be required before work begins.

3.3 Type of QFN Certification

Integration of the Z-Wave chip can be device specific or in a custom version of a Z-Wave module that is intended for use in multiple devices. Please note that each of the individual devices utilizing this QFN implementation will also need standard Z-Wave Plus certifications for compliance.

☐ Custom module for use in multiple devices*

☐ Device specific dedicated circuit

☐ Modification** of a QFN certified circuit or module

Original QFN Certification or Case Number: _____

Original Circuit/Module Identifier: _____

Hardware Version/Revision Number _____

Description of changes: _____

* A custom module is for use only by the company certifying it and cannot be sold to other developers. Private label devices manufactured by the certifying company may utilize the QFN certified module.

** Any change to a QFN certified circuit or module MUST be evaluated by Silicon Labs' R&D to determine whether a new certification is required.

3.4 Basic Z-Wave Product Certification Information

* Required fields

Only one dedicated circuit or custom module can be certified on this form. Please refer to INS10638 Certification Overview [1] for details.

ASIC being used: _____

Circuit/module identifier*: _____ Examples: part number, final PCB revision number

Hardware version number: _____

Circuit/module description*: _____

Identify end device this circuit will be used in (mandatory if dedicated circuit): _____

3.5 Market (Region) and Operating frequencies

Country RF Operating frequency 2ch

2 Channel

- ☐ AE: UAE: 868.42 MHz RF frequency
- ☐ AU: Australia/New Zealand: 921.42 MHz RF frequency
- ☐ BR: Brazil: 921.42 MHz RF frequency
- ☐ CL: Chile: 908.42 MHz RF frequency
- ☐ CN: China: 868.42 MHz RF frequency
- ☐ EU: Europe (CEPT): 868.42 MHz RF frequency
- ☐ HK: Hong Kong: 919.82 MHz RF frequency
- ☐ IL: Israel: 916.00 MHz RF frequency
- ☐ IN: India: 865.22 MHz RF frequency
- ☐ MY: Malaysia: 868.10 MHz RF frequency
- ☐ RU: Russia: 869.0 MHz RF frequency
- ☐ SG: Singapore: 868.42 MHz RF frequency
- ☐ US: US/Canada/Mexico: 908.42 MHz RF frequency
- ☐ ZA: South Africa: 868.42 MHz RF frequency

3 Channel

- ☐ JP: Japan: 922-926 MHz RF frequency
- ☐ KR: South Korea: 919-923 MHz RF frequency
- ☐ TW: Taiwan: 922-926 MHz RF frequency

3.6 Material required for QFN certification

1. Two physical, production graded entities of the product. At least one product must provide easy access to the Z-Wave system of the product. Both devices MUST be calibrated before shipping them to the test facility.
2. Complete product documentation:
    a. Schematics
    b. Bill of materials, with component tolerances
    c. Datasheets for specific components (XTAL, SAW filter)
    d. PCB documentation (Gerber-files)
3. Special instructions and materials required for testing (especially valid if the product is mains powered).
    a. This includes programing cable and instructions
4. A completed and signed copy of the Self-Certification page from this form must be submitted along with the completed Word Document form to the e-mail address shown below.

Samples and materials listed in 1, 2 & 3 above should be sent to address below. The material submitted to Silicon Labs will not be returned after certification.

Silicon Labs Technology Singapore Pte Ltd.
No. 5 Harper Road
#03-01
Singapore 369673
Tel: +65 6749 1877 extension 100
Fax: +65 6749 1844

E-mail: Z-Wave_Certification@sdesigns.com

3.7 Liability

The responsibility of the products Z-Wave performance, electrical performance, safety, regulatory approval and user-friendliness lies solely with the manufacturer of the product.

4 DESCRIPTION OF CERTIFICATION PROCESS

The purpose of the QFN certification process is to ensure, that the product certified has a base line RF quality which should ensure proper RF and product functionality in a Z-Wave network.

The aim of the certification is to ensure, that the product certified should work as good as if the product was built utilizing a Z-Wave module manufactured by Silicon Labs.

The QFN certification verifies

- Component tolerances
- Design of Power Supply
- Receiver Sensitivity (Conducted)
- Transmit power (Conducted)
- Frequency accuracy

The information for the Z-Wave Compliance Statement is provided in tabular form. The same tables are used by the OEM to provide a confirmation of the self-certification performed by the OEM, and the result of the Verification Testing (where applicable).

The following notation is used in the form:

Column: Status • The **Status** column is the requirement status, i.e. defines what need to be implemented for Z-Wave compliance.	
Notation	**Description**
M	Mandatory. If not satisfied device fails QFN certification.
O	Optional.
[x]S.*n*	[x] is either M for mandatory or O for optional Selection - Must support at least one of the items marked with status "*[x]S.n".* (e.g. if multiple items are marked with "MS.3" one must be supported)

Column: Self-Certification • The **Self-Certification** column is filled out by the OEM to document that a test has been performed by the OEM.	
Notation	**Description**
Y	Supported / confirmed in self-certification test (see also additional comments below)
–	Not supported
Co	A comment regarding the support of this item is provided by the OEM submitting this Z-Wave Certification Form in an attached document. Note: Use of such comments shall be a rare exception. The Z-Wave Certification Group will make the determination about Z-Wave compliance in this case.

Column: Verification • The **Verification** column is filled out by the authorized Z Wave Test Partner after test of the support / non-support of the corresponding item.	
Notation	**Description**
Y	Compliance verified in test (without Ad-hoc resolution)
Y-F	Test item verified compliance in first attempt but failed in second attempt (Ad-hoc resolution or re-certification)
F	Failure in test; Ad-hoc Resolution has not reached compliance; Explanation is provided in section 5 of this document
F-Y	Failure in test in first attempt; compliance verified after Ad-hoc Resolution; Explanation is provided in section 5 of this document
Co	A comment regarding the verification of this item is provided by the Z-Wave Test Partner. Refer to details in chapter 5, Verification Test
NT	Not tested; Explanation is provided in section 5 of this document

The following section describes which reviews and measurements which are done during the QFN certification

4.1 Pre-submission requirements

Item Number	Item Description	Status	Certification	
			Self-Certification	Verification
A.1	Programming Interface:			
A.1.1	Rx, Tx, Reset, Gnd and Supply externally available through either standard connector or wires soldered to device.	M	-	
A.2	RF interface:			
A.2.1	RF output available through standard connector () or SMA 'fuse' soldered to the output.	M	-	
A.3	Crystal calibration:			
A.3.1	NVR contains a valid crystal calibration value.	M	-	

4.2 Schematic and BOM review

Item Number	Item Description	Status	Certification	
			Self-Certification	Verification
B.1	Critical Components:			
B.1.1	SAW filter from AVL[note1]..	M	-	
B.1.2	Crystal from AVL[note1].	M	-	
B.1.3	The System Crystal load capacitors have an accuracy of 5% or better and are an "NP0" type.	M	-	
B.1.4	L1, L2, L3 and C1 are the same value as specified by the respective datasheet [note 2] These values are strongly recommended	O	-	
B.2	Power supply:			
B.2.1	Same decoupling as used in respective datasheet[note2].	O	-	
B.2.2	No external pull-up/down resistors on unused IO's	O	-	

note1: From ACTE

note2: Either SD3502 datasheet figure 11 or SD3503 datasheet figure 12.

4.3 Measurements

Item Number	Item Description	Status	Certification	
			Self-Certification	Verification
C.1	Transmit power:			
C.1.1	Larger than 2 dBm at power setting 63	M	-	
C.1.2	Larger than -32 dBm at power setting 1	O	-	
C.2	Frequency Accuracy:			
C.2.1	± 13 ppm when calibrated	M	-	
C.3	Spurious Emissions (at full power, power setting 63):			
C.3.1	± 200, 400 and 600 kHz from carrier less than -50 dBc	O	-	
C.3.2	± 32 and 64 MHz from carrier less than -50 dBc	O	-	
C.3.3	2nd harmonic less than -54.3 dBc	O	-	
C.3.4	3rd harmonic less than -42.4 dBc	O	-	
C.4	LO Leakage:			
C.4.1	± 200 and 325 kHz (both high and low side) less than -80 dBm	O	-	
C.5	Sensitivity:			
C.5.1	9.6 kbps less than -101 dBm	M	-	
C.5.2	40 kbps less than -97.2 dBm	M	-	
C.5.3	100 kbps less than -91.8 dBm	M	-	

4.4 PCB layout

Item Number	Item Description	Status	Certification	
			Self-Certification	Verification
D.1	Thermal relief	O	-	

Only if measurements fail:

Anything odd or suspicious? Examples of issues seen in other QFN certifications: Grounding for RF properly done? Is ground return path for RF shared by e.g. the crystal?

Click here to enter text.

Click here to enter text.

5 SELF-CERTIFICATION

The following self-certification must be provided by the party applying for Z-Wave Certification.

Circuit/module identifier*: _____

Hardware version number*: _____

* This information must match the information provided in section 3.4

Company: _____

Certification by (Name): _____

Title: _____

Additional Comments

(Optional, e.g. to clarify items that deviate from Z-Wave compliance rules):

Item Number	Comment

Authorization to install and use software provided with the product

If the product includes software that needs to be installed, we authorize Silicon Labs to install the software and to use the software for Z-Wave certification purposes.

We hereby certify

- that we have followed the Z-Wave Certification rules;
- that we conducted the Self-certification tests for the above specified product and reached the results documented in this form; and
- that the information provided in this Certification Form is accurate to the best of our knowledge.

Signature: _____

Date: Click here to enter a date.

IMPORTANT!

This page must be signed and submitted electronically when submitting the entire Word document. Submitting a scanned copy of this page via email is sufficient.

6 INITIAL CERTIFICATION REVIEW

Initial Certification Review - General comments & conditions:

_____

Review comments to specific items of the Z-Wave Product Compliance Statement:

Item Number	Comment

Result of Initial Certification Review:

☐ **Passed**

☐ **Passed Conditionally** (see above for conditions)

☐ **Form issues** (OEM informed and Certification Form returned for corrections)

Review performed by (Name): _____

Date: Click here to enter a date.

7 TEST RESULTS

Transmitter

Frequency Error: Click here to enter text.

TX Power: Click here to enter text.

Harmonics: Click here to enter text.

Receiver

LO Leakage: Click here to enter text.

Sensitivity: Click here to enter text.

Photos (if needed):

8 CONCLUSION

1. Click here to enter text.

8.1 Certification result:

☐ **Product has not passed Z-Wave Certification**

☐ **Product has passed Z-Wave Certification**

QFN Certification Number assigned: _____

This certification is valid only for the specific circuit/module tested. Any changes will require review by Silicon Labs' R&D to determine whether a new certification is required. The above QFN certification number must be referenced in the certification form for any device utilizing this circuit/module.

Final Review

By: _____

Date: Click here to enter a date.

REFERENCES

The last two digits of the document part number refer to the revision of the document. When the document revision is listed as “xx” please refer to the latest revision of the document.

[1] Silicon Labs, INS10638, Instruction, Z Wave Certification Overview

[2] Silicon Labs, DSH12206, Data Sheet, SD3502

[3] Silicon Labs, DSH12469, Data Sheet, SD3503

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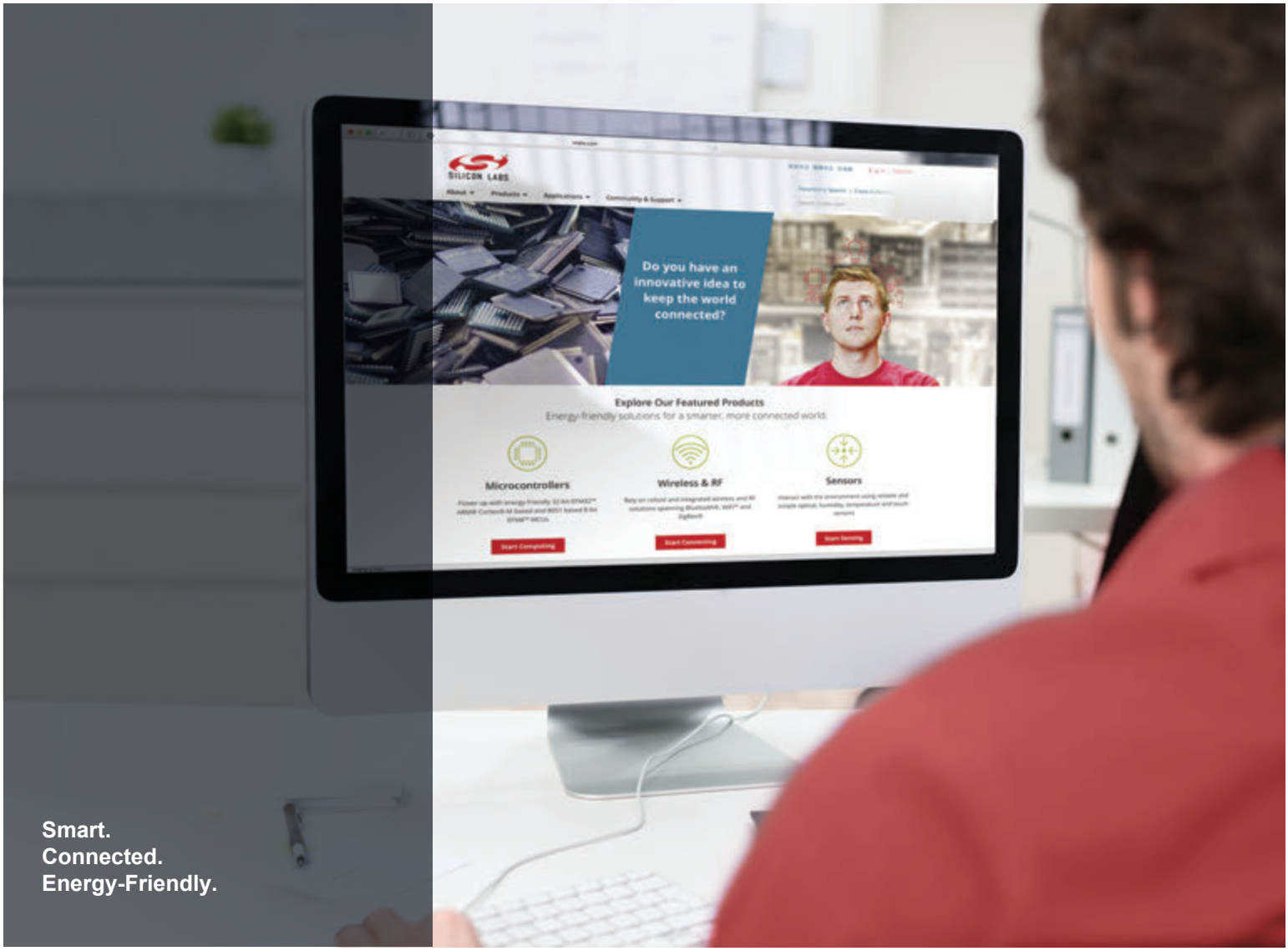

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