Letter of Conformity for Grid Support Interactive Inverter

UL Standard No. 1741-Third Edition Supplement SA And SB

Certificate: 80034168 **Master Contract:** 203213

Project: 80228053 **Date Issued:** November 28, 2024

Issued To: **Fronius International GmbH**
Guenter Fronius Strasse 1
Wels-Thalheim, Upper Austria, 4600
Austria

Attention: Josef Feichtinger

The products listed below have been found to comply with the applicable requirements of UL 1741-3rd Edition (Rev. May 19, 2023) Supplement SA8 to SA 15 and SA17 to SA18, SB4.2 and SB4.3- Grid Support Utility Interactive Inverters And Converters.
The Products also comply with Power Control Systems UL3141 except BBOC, FCOC, BCOC and single source pcs control functions not implemented.

Issued by: PeterLim
Peter Lim

PRODUCTS

CLASS - C531109 - POWER SUPPLIES Distributed Generation Power Systems Equipment
CLASS - C531189 - POWER SUPPLIES - Distributed Generation Power Systems Equipment - Certified to U.S. Standards

Transformerless Special Purpose Grid Support Interactive Inverter, Primo GEN24 3.8 208-240; Primo GEN24 3.8 208-240 Plus; Primo GEN24 5.0 208-240; Primo GEN24 5.0 208-240 Plus; Primo GEN24 6.0 208-240, Primo GEN24 6.0 208-240 Plus; Primo GEN24 7.7 208-240; Primo GEN24 7.7 208-240 Plus; Primo

GEN24 10.0 208-240 and Primo GEN24 10.0 208-240 Plus permanently connected.

For details related to rating and notes, reference should be made to the CSA Certification Record, the Descriptive Report or Annex A Ratings.

APPLICABLE REQUIREMENTS

Standards Used	Description
CSA C22.2 No. 107.1:16 (R2021)	Power Conversion Equipment
CSA C22.2 No. 330:23	Photovoltaic Rapid Shutdown Systems
CSA C22.2 No. 290:19	Photovoltaic combiners and recombiners
CSA C22.3 No. 9:20 (Second edition)	Interconnection of distributed energy resources and electricity supply systems
UL 1741:2021 - Third Edition - Including revisions through May 19, 2023	UL Standard for Safety Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
UL Std No. 1741 CRD (April 01, 2023)	Non-Isolated EPS Interactive PV Inverters Rated Less Than 30kVA.
UL 1699B (First Edition; Reprint with revisions through and including July 9, 2024)	UL Standard for safety Photovoltaic (PV) DC Arc-Fault Circuit Protection
UL 3141 Issue 2 (Dated October 9, 2024)	Outline Investigation for Power Control Systems

*Note:

1. In accordance with UL 1741 (Third Edition, dated May 19, 2023), compliance requires meeting the specifications detailed in UL 1741 Supplement SA and SB, along with the Smart Inverter Requirements outlined in the Source Requirement Document (SRD). In addition, the product has been verified according to UL 1741 Supplement SB and IEEE 1547.1-2020, ensuring alignment with the SRD specified in IEEE 1547-2018, IEEE 1547a-2020, IEEE 1547:2018 Errata, and the SRD established by:
   a. California Electric Rule 21.
   b. The Hawaiian Electric Code with required URP (SRD-V2.0, dated 11/18/2022).
   c. Technical Interconnection Requirements NEPR-MI-2019-0009 (May 19, 2022)
   d. Default IEEE 1547-2018 Setting Requirements for ISO-NE (December 13, 2022)
   e. New Mexico (EPE, PNM, and Xcel Energy (SPS) TIIR's) (June 30, 2023, The assessment of the grid support function is conducted in accordance with IEEE 1547.1-2020, and the interoperability is confirmed through verification against the IEEE 2030.5-2018 communication protocol.

2. The products have also been verified for functional safety under Class B for CSA C22.2 No. 0.8 related to the PVRSE and related Inverter Shutdown and Remote Shutdown functions and UL1998 Software Class 1 for all safety functions.
3. Meeting UL1741 CRDs include compliance with PV combiner, ground fault (or IMI isolation) detection and PCS reference to UL3141 Issue 2 Outline of Investigation for Power Control Systems.
4. Grid support Utility Interactive inverter, Fronius inverter is evaluated with reactive power priority Volt/Var Mode (Q(V)) Test.

Additional Notes:

1) Conformity to UL 1741-Third Edition includes compliance with applicable requirements of UL1741 PVRSE and Supplement SA8 to SA15, SA17, SA18 - GRID SUPPORT UTILITY INTERACTIVE INVERTERS AND CONVERTERS, California Rule 21(SRDs), IEEE 1547-2003, IEEE1547a-2014, IEEE 1547.1-2005 and IEEE 1547.1a-2015. Meeting UL1741 CRD includes compliance with PV combiner.
2) To fulfill the rapid shutdown requirements of the NEC Article 690.12 and CEC Sec 64- 218 Photovoltaic system rapid shutdown with the Primo GEN24 series models, the inverter can be used together with a suitable rapid shutdown device, or the inverter must be mounted within the boundary values given in the NEC and CEC Article. The PV input of the inverter complies with the requirements of following standards to ensure the PV conductors are within the controlled limits of 30Vdc, 15Vac and 8A within the 30s:
   a. UL1741 3rd Edition
   b. CAN/CSA C22.2 No. 330-23
3) The integrated combiner unit is also evaluated to reference standards covering UL1741 CRD and CSA-C22.2 No.290:19 (2nd Edition) for Photovoltaic combiners and recombiners. The evaluation includes reference standard C62.41-1991 for Surge Voltages in Low Voltage AC Power Circuits.
4) Conformity to UL3141 PCS covering Power Export Limit (PEL) at the Point of Common Coupling (PCC), Export limiting from Energy Storage Systems, Import limiting to Energy Storage Systems with the ESS operating modes a) Unrestricted, b) Export only Mode, C) Import only Mode and d) No Exchange Mode. UL1341 Issue 2 section 7 PCS safety analysis for functional safety: Compliance with user protection through the application of passive protective elements. No safety critical system failures investigated.

Certificate: 80034168
Project: 80228053

Master Contract: 203213
Date Issued: November 28, 2024

HISTORY

Edition 1: (Project 80034168)
Tests were performed on representative model Primo GEN24 6.0 208-240 Plus, at Fronius International GmbH, Guenter Fronius Strasse 1, Wels-Thalheim, 4600 Austria under the CSA SMTC program approved by CSA certifier with acceptable results.

Certificate: 80034168 Project: 80034168 Master Contract: 203213 Date Issued: May 28, 2020
DQD 507 Rev 2020-03-16 © 2018 CSA Group. All rights reserved. Page 3

Utility interactive evaluations were conducted with the following firmware: Software Version	Control Devises	Models: Primo GEN24 3.8 208-240 and Primo GEN24 3.8 208-240 Plus Primo GEN24 5.0 208-240 and Primo GEN24 5.0 208-240 Plus Primo GEN24 6.0 208-240 and Primo GEN24 6.0 208-240 Plus
ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	V2.10.2 (release date 24/01/2020)
KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	V2.16.2 (release date 24/01/2020)
Check-Sum ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	0x57a62a64 (release date 24/01/2020)
Check-Sum KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	0xbab5e48f (release date 24/01/2020)

The following tests were performed with the requirements of UL 1741-2nd Edition as per the SUPPLEMENT - GRID SUPPORT UTILITY INTERACTIVE INVERTERS AND CONVERTERS (Rev. February 15, 2018) with acceptable results.

UL1741 – SA	Applicable Requirement/Topic	Comment
UL1741 - SA8	Anti-islanding Protection - Unintentional Islanding with Grid Support Functions Enabled	PASS
UL1741 - SA9	L/HVRT Low and High Voltage Ride-Through	PASS
UL1741 - SA10	L/HFRT Low and High Frequency Ride-Through	PASS
UL1741 - SA11	RR – Normal Ramp Rate and SS – Soft-Start Ramp Rate	PASS
UL1741 - SA12	SPF – Specified Power Factor	PASS
UL1741 - SA13	Volt/VAr Mode (Q(V)	PASS
UL1741 - SA14	Frequency-Watt (FW)	PASS
UL1741 - SA15	Volt-Watt (VW)	PASS

Edition:2: (Project 80179059)

Update report 80034168 to amend applicable standard from UL1741 2nd edition to UL1741 3rd Edition and evaluate additional alternate components. Also change manufacturer Silicon Lab to Skyworks Solutions Inc. for opto coupler(U13) – same specifications. Added missing critical component list for PWB PILOT2 (4,071,817). Construction review was conducted for the UL 1741 3rd edition standard. Also, corrected the typo errors for max array short and backfeed current in the specification. The alternate T9 has the identical construction and UL approved EIS, also the alternate enclosure materials met the original construction and material properties requirements.

No additional testing is deemed necessary based on the differences as compared to UL1741 2nd edition against the third edition (refer to checklist attached). All alternate components added are within the specifications of the original outlined and meeting form, fit and functions.

Edition: 3 (Project 80203034)

Tests were performed on models Primo GEN24 7.7 208-240, Primo GEN24 10.0 208-240 and Primo GEN24 6.0 208-240, at Fronius International GmbH, Guenter Fronius Strasse 1, Wels-Thalheim, 4600 Austria under the CSA SMTC program approved by CSA certifier with acceptable results.

Certificate: 80034168 Project: 80203034 Master Contract: 203213 Date Issued: Jun 10, 2020

Utility interactive evaluations were conducted with the following firmware:

Software Version	Control Devises	Primo GEN24 3.8 208-240 Primo GEN24 3.8 208-240 Plus	Primo GEN24 5.0 208-240 Primo GEN24 5.0 208-240 Plus	Primo GEN24 6.0 208-240 Primo GEN24 6.0 208-240 Plus	Primo GEN24 7.7 208-240 Primo GEN24 7.7 208-240 Plus	Primo GEN24 10.0 208-240 Primo GEN24 10.0 208-240 Plus
ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	V2.10.2 (release date 24/01/2020) V2.28.5 (release date 23/02/2024)			V2.28.5 (release date 23/02/2024)	
KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	V2.16.2 (release date 24/01/2020) V2.36.6 (release date 23/02/2024)			V2.36.6 (release date 23/02/2024)	
Check-Sum ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	0x57a62a64 (release date 24/01/2020) 0xe5b98a5d (release date 23/02/2024)			0xe5b98a5d (release date 23/02/2024)	
Check-Sum KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	0xbab5e48f (release date 24/01/2020) 0x95013193 (release date 23/02/2024)			0x95013193 (release date 23/02/2024)	

Grid Tied Requirements		
UL1741 SUPPLEMENT SB – GRID SUPPORT UTILITY-INTERACTIVE INVERTERS AND CONVERTERS BASED UPON IEEE, 1547-2018 and IEEE 1547.1-2020		
SB4.2	Grid support utility interconnection performance	Meeting Requirements
SB4.2A	Performance Categories.	Cat III B. Meeting Requirements
SB4.3	Additional requirements for testing according to IEEE 1547.1-2020.	Meeting Requirements

Edition: 4 (Project 80228053)

Update report 80034168(80203034) according to UL1741 CRD for PCS which reference to UL3141 and minor software upgrade. Add missing applicable stand CSA C22.2 No. 290 for the combiner. A few Specifications in the rating table in page 2 were updated due to entry and calculation errors. Instruction manuals were updated to include PIL and PEL safety instruction requirements as outlined in UL3141 Sec 11 and 12. Update Critical Component list to include equivalent of alternate component S1- DC switch, Capacitors C72 /C241 and Processor U1 with similar form, fit factors.

Based on the above Software upgrade, additional alternative Processor and the requirements of UL3141 outlines, additional tests were deemed necessary (refer to descriptive and Test reports for details).

Utility interactive evaluations and PCS were conducted with the following firmware:

Software Version	Control Devises	Primo GEN24 3.8 208-240 Primo GEN24 3.8 208-240 Plus	Primo GEN24 5.0 208-240 Primo GEN24 5.0 208-240 Plus	Primo GEN24 6.0 208-240 Primo GEN24 6.0 208-240 Plus	Primo GEN24 7.7 208-240 Primo GEN24 7.7 208-240 Plus	Primo GEN24 10.0 208-240 Primo GEN24 10.0 208-240 Plus
ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	V2.10.2 (release date 24/01/2020) V2.28.5 (release date 23/02/2024) V3.0.5 (release date 21/08/2024)			V2.28.5 (release date 23/02/2024) V3.0.5 (release date 21/08/2024)	
KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	V2.16.2 (release date 24/01/2020) V2.36.6 (release date 23/02/2024) V3.1.5 (release date 21/08/2024)			V2.36.6 (release date 23/02/2024) V3.1.5 (release date 21/08/2024)	
Check-Sum ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	0x57a62a64 (release date 24/01/2020) 0xe5b98a5d (release date 23/02/2024) 0x1ec9961e (release date 21/08/2024)			0xe5b98a5d (release date 23/02/2024) 0x1ec9961e (release date 21/08/2024)	
Check-Sum KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	0xbab5e48f (release date 24/01/2020) 0x95013193 (release date 23/02/2024) 0xbacc2d79 (release date 21/08/2024)			0x95013193 (release date 23/02/2024) 0xbacc2d79 (release date 21/08/2024)	

Grid Tied Requirements		
UL1741 SUPPLEMENT SB – GRID SUPPORT UTILITY-INTERACTIVE INVERTERS AND CONVERTERS BASED UPON IEEE, 1547-2018 and IEEE 1547.1-2020		
SB4.2	Grid support utility interconnection performance	Meeting Requirements
SB4.2A	Performance Categories.	Cat III B. Meeting Requirements
SB4.3	Additional requirements for testing according to IEEE 1547.1-2020.	Meeting Requirements

General Overview of UL 1741 PCS CRD Evaluations: - Reference to UL3141		
UL3141	Applicable Requirement/Topic	Comment
Sec 8.3	Step Change in Load Test for Multisource PCS	These tests are performed as part of the sequence in 8.8.3 and 8.8.4
Sec 8.4	Step Change in Generation Test for Multisource PCS	These tests are performed as part of the sequence in 8.8.3 and 8.8.4
Sec 8.5	Normal Operating Tests for Single Source PCS (SSOC)	BBOC, FCOC, BCOC and Single Source PCS control functions not implemented.

General Overview of UL 1741 PCS CRD Evaluations: - Reference to UL3141		
UL3141	Applicable Requirement/Topic	Comment
Sec 8.6.2	Export limiting from all sources (PEL)	The PCS consists only of one inverter with PV and Battery input. No other exporting sources allowed within the PCS. Therefore, the tests are covered with the ESS tests (See Sec 8.8.3)
Sec 8.6.3	Power Import Limiting (PIL) at the Point of Common Coupling (PCC)	No implemented. PIL not include in this evaluation.
Sec 8.7	Loss of Control Circuit Abnormal Tests	See test data
Sec 8.8.3	Export limiting from Energy Storage Systems	See test data
Se 8.8.4	Import limiting to Energy Storage Systems	See test data

Supplement to Certificate of Compliance

Certificate: 80034168 **Master Contract:** 203213

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
80228053	2024-11-28	Update report 80034168(80203034) according to UL1741 CRD for PCS which reference to UL3141 and minor software upgrade.
80203034	2024-06-12	Update report 80034168 (80179059) to include UL1741 SB testing and additional two new models Series for Fronius models Primo GEN24 7.7 208-240, Primo GEN24 7.7 208-240 Plus and Fronius Primo GEN24 10.0 208-240 and Primo GEN24 10.0 208-240 Plus.
80179059	2023-10-17	Update report 80034168 to revise applicable standard from UL1741 2nd edition to UL1741 3rd Edition and evaluate additional alternate components.
80034168	2020-05-21	Original model certification new model Primo GEN24 (C/US) Product CLASS 5311- 09 and CLASS 5311 89. -Include CEC efficiency attestation.

Letter of Attestation

Document: 80203039 **Master Contract:** 203213

Project: 80203039 **Date Issued:** Jun 3, 2024

Issued to: Fronius International GmbH
Guenter Fronius Strasse 1
Wels-Thalheim,
Upper Austria, 4600
Austria
Attention: Josef Feichtinger

CSA Group hereby confirms that it has completed an evaluation of:

Transformerless Special Purpose Grid Support Interactive Inverter, Primo GEN24 3.8 208-240; Primo GEN24 3.8 208-240 Plus; Primo GEN24 5.0 208-240; Primo GEN24 5.0 208-240 Plus; Primo GEN24 6.0 208-240, Primo GEN24 6.0 208-240 Plus; Primo GEN24 7.7 208-240; Primo GEN24 7.7 208-240 Plus; Primo GEN24 10.0 208-240 and Primo GEN24 10.0 208-240 Plus permanently connected.

CSA Group hereby attests that the products identified above and described in test report 80203039 dated May 27, 2024

complies with the following standards/tests, to the extent applicable:

Common Smart Inverter Profile V2.1 with reference to SunSpec IEEE2030.5 Common Smart Inverter Profile (CSIP) Conformance Test Procedure V1.3

Issued by: *Peter Lim*

CSA Group

THIS LETTER OF ATTESTATION DOES NOT AUTHORIZE THE USE OF THE CSA MARK ON THE SUBJECT PRODUCTS.
QUOTATIONS FROM THE TEST REPORT OR THE USE OF THE NAME CSA GROUP OR ITS REGISTERED TRADEMARK, IN ANY WAY, IS NOT PERMITTED WITHOUT PRIOR WRITTEN CONSENT OF CSA GROUP TESTING & CERTIFICATION INC.

Descriptive Report

MASTER CONTRACT: 203213
REPORT: 80203039
PROJECT: 80203039

Edition 1: May 27, 2024; Project 80203039 - Richmond
Prepared By: Peter Lim
Authorized By: Peter Lim

Contents:

PRODUCTS

Transformerless Special Purpose Grid Support Interactive Inverter, Primo GEN24 3.8 208-240; Primo GEN24 3.8 208-240 Plus; Primo GEN24 5.0 208-240; Primo GEN24 5.0 208-240 Plus; Primo GEN24 6.0 208-240, Primo GEN24 6.0 208-240 Plus; Primo GEN24 7.7 208-240; Primo GEN24 7.7 208-240 Plus; Primo GEN24 10.0 208-240 and Primo GEN24 10.0 208-240 Plus permanently connected.

For detailed information regarding ratings and notes, please refer to Attachment Annex A Ratings.

APPLICABLE REQUIREMENTS:

1. Common Smart Inverter Profile V2.1
2. SunSpec IEEE 2030.5 Common Smart Inverter Profile (CSIP) Conformance Test Procedures V1.3
3. Resolution E-5000 & E-5036.

MARKINGS

Not Applicable. Attestation Project

ALTERATIONS

Not Applicable

FACTORY TESTS

Not Applicable

1st Floor, Building 4, Qilai Industrial City, 889 Yishan Road, Shanghai, 200233 China
Telephone: (86)21.33688282 Fax: (86)21.33688122 www.csagroup.org

DESCRIPTION

CSA Group hereby attests that the products identified above and described in test report 80203039 dated May 23, 2024 complies with the following standards/tests, to the extent applicable: Common Smart Inverter Profile V2.1 with reference to SunSpec IEEE2030.5 Common Smart Inverter Profile (CSIP) Conformance Test Procedure V1.3.

DEVICE(S) UNDER TEST IDENTIFICATION.

Gateway Information:

Product Type	CA Rule 21/CSIP DER Client
Product Name (Aggregator)	Sync 2310
Product Model	KIOE2300-M5
Product Object ID	DER-1072
Software Operation Environment Type	local
Software Name	Kalkitech SCT
Software Version	4.20.2 (07-14-2023)
Software Checksum	758A1927C28004EFDCB04693504D725B
Operating System	Windows 11
Operating System Version	10.0.22621

Test Tool information:

Tool Company	QualityLogic
Tool Name	IEEE2030.5 Client Tester - FTS
Tool Version	V4.0

TEST SUMMARY

As the gateway used by customer is certified by SunSpec (Bearing Sunspec Certificate Number CS-000031 https://sunspec.org/wp-content/uploads/2020/12/SunSpec-ASE-certificate-CS-000031.pdf) the compatibility testing is as part of IEEE2030.5 conformance testing of the gateway. According to the Resolution E-5000 & E-5036, the following SunSpec CSIP test procedures on the gateway while it is connected to the representative Fronius's inverter model Primo GEN24 10.0 208-240 Plus. The test was conducted using the QualityLogic IEEE 2030.5 Test Harness which implements the test cases that are described in the CSIP Test Procedures document.

TEST CONFIGURATION

Test Scope:

The following tests were performed on inverter. For detailed test cases, refer to section 3.

- Inverter Status (BASIC-028)
- Inverter Meter Reading (BASIC-029)
- Basic Inverter Control – Volt/Var (BASIC-006)
- Basic Inverter Control – Fixed Power Factor (BASIC-008)
- Basic Inverter Control – Volt-Watt (BASIC -011)

TEST ENVIRONMENT

Temperature in the range 15℃ to 35℃	Yes
Relative humidity in the range 20% to 75%	Yes

TEST PROCEDURES

The test has been run on May 27, 2024, with QualityLogic Inc. IEEE2030.5 Conformance Test Program. The SunSpec approved QualityLogic Test tools used was the Version 4.0 release of Functional Test Suite Client Tester.

TEST RESULT

Summary Convention

The following "Result" convention is used in this summary.

Result Items	Description
PASS	All test cases that have been executed have passed.
FAIL	At least one test case has failed.
NOT APPLICABLE	The test case was not applicable to device under test

Summary of Test Results

Test Name	Test Description	Test Result
BASIC-006	Basic Inverter Control (Volt/Var) [C, A, S]	PASS
BASIC-008	Basic Inverter Control (Fixed Power Factor) [C, A, S]	PASS
BASIC-011	Basic Inverter Control (Volt-Watt) [C, A, S]	PASS
BASIC-028	Inverter Status [C, A, S]	PASS
BASIC-029	Inverter Meter Reading [C, A, S]	PASS

TEST HISTORY

Edition: 1 (Project 80203039)

This is an attestation report pertaining meeting Common Smart Inverter Profile V2.1 with reference to SunSpec IEEE2030.5 Common Smart Inverter Profile (CSIP) Conformance Test Procedure V1.3 and providing E-5000 & E-5036 Vendor Evidence Letter. All testing deemed necessary (See summary of test) meets the test requirements mentioned above.

---End of Report---

Letter of Attestation

Document: 80203040 **Master Contract:** 203213

Project: 80203040 **Date Issued:** May 22, 2024

Issued to: **Fronius International GmbH**
Guenter Fronius Strasse 1
Wels-Thalheim Upper Austria 4600
Austria
Attention: Josef Feichtinger

CSA Group hereby confirms that it has completed an evaluation of:
Photovoltaic Rapid Shutdown Equipment integral to the following Interactive PV Inverters Models:

1. ***PVRSE 1PN6K V1.1 as an integral part of the models Primo GEN24 3.8 208-240, Primo GEN24 3.8 208-240 Plus, Primo GEN24 5.0 208-240, Primo GEN24 5.0 208-240 Plus, Primo GEN24 6.0 208-240, Primo GEN24 6.0 208-240 Plus***

2. ***PVRSE 1PN10K V0.6 as an integral part of the models: Primo GEN24 7.7 208-240, Primo GEN24 7.7 208-240 Plus, Primo GEN24 10.0 208-240, Primo GEN24 10.0 208-240 Plus***

CSA Group hereby attests that the products identified above and described in test reports:
80203040
complies with the following standards/tests, to the extent applicable:

Communication Signal for Rapid Shutdown SunSpec Interoperability Specification (Rev. April 20, 2021, Ver. 40) with reference to Communication Signal for Rapid Shutdown Test Specification (REV. April 20, 2021_Ver 19):

2.2.1. Modulation accuracy test
2.2.2. Transmitter output level test and transmitter output impedance test
2.2.3. Transmitter in band spurious emission test
2.2.4. Transmitter out of band spurious emission test

Issued by: *EduardoSaldana*
Eduardo Saldana

CSA Group

Document: 80203040 **Master Contract:** 203213

Project: 80203040 **Date:** May 22, 2024

THIS LETTER OF ATTESTATION DOES NOT AUTHORIZE THE USE OF THE CSA MARK ON THE SUBJECT PRODUCTS.
QUOTATIONS FROM THE TEST REPORT OR THE USE OF THE NAME CSA GROUP OR ITS REGISTERED TRADEMARK, IN ANY WAY, IS NOT PERMITTED WITHOUT PRIOR WRITTEN CONSENT OF CSA GROUP TESTING & CERTIFICATION INC.

Descriptive Report

MASTER CONTRACT: 203213
REPORT: 80203040
PROJECT: 80203040

Edition 1: May 22, 2024; Project 80203040 - Kunshan
Prepared By: Eduardo Saldana
Authorized By: Peter Lim

Contents: Letter of Attestation – 2 Pages
Description and Tests – 6 Pages
Attachment 1 – CSA Test Pack – (8 Pages)
Attachment 2 – Sunspec PICS Report
Annex A – Rating (3 Pages)

PRODUCTS

Photovoltaic Rapid Shutdown System Equipment (PVRSE) as an integral part of the following Interactive PV Inverters:

PVRSE Communication Device Model: 1PN6K Version 1.1 with associated Transformerless Special Purpose Grid Support Interactive Inverter:

- Primo GEN24 3.8 208-240
- Primo GEN24 3.8 208-240 Plus
- Primo GEN24 5.0 208-240
- Primo GEN24 5.0 208-240 Plus
- Primo GEN24 6.0 208-240
- Primo GEN24 6.0 208-240 Plus

PVRSE Communication Device Model: 1PN10K Version 0.6 with associated Transformerless Special Purpose Grid Support Interactive Inverter:

- Primo GEN24 7.7 208-240
- Primo GEN24 7.7 208-240 Plus
- Primo GEN24 10.0 208-240
- Primo GEN24 10.0 208-240 Plus

For detailed information regarding ratings and notes, please refer to Attachment Annex A Ratings.

Software Version	Control Devises	Primo GEN24 3.8 208-240 Primo GEN24 3.8 208-240 Plus	Primo GEN24 5.0 208-240 Primo GEN24 5.0 208-240 Plus	Primo GEN24 6.0 208-240 Primo GEN24 6.0 208-240 Plus	Primo GEN24 7.7 208-240 Primo GEN24 7.7 208-240 Plus	Primo GEN24 10.0 208-240 Primo GEN24 10.0 208-240 Plus
ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	V2.10.2 (release date 24/01/2020) V2.28.5 (release date 23/02/2024)			V2.28.5 (release date 23/02/2024)	
KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	V2.16.2 (release date 24/01/2020) V2.36.6 (release date 23/02/2024)			V2.36.6 (release date 23/02/2024)	
Check-Sum ZEUS	ST Microelectronics / STM32F765NGH7 (U20)	0x57a62a64 (release date 24/01/2020) 0xe5b98a5d (release date 23/02/2024)			0xe5b98a5d (release date 23/02/2024)	
Check-Sum KRONOS	ST Microelectronics / STM32F765NGH7 (U1)	0xbab5e48f (release date 24/01/2020) 0x95013193 (release date 23/02/2024)			0x95013193 (release date 23/02/2024)	

APPLICABLE REQUIREMENTS

Test of Photovoltaic Rapid Shutdown System Equipment to meet Communication Signal for Rapid Shutdown SunSpec Interoperability Specification of the following requirements:

Communication Signal for Rapid Shutdown SunSpec Interoperability Specification (Rev. April 20, 2021, VER. 40) with reference to Communication Signal for Rapid Shutdown Test Specification (Rev. April 20, 2021, VER. 19).

Limited to the following clauses:

2.2.1. Modulation accuracy test
2.2.2. Transmitter output level test and transmitter output impedance test
2.2.3. Transmitter in band spurious emission test
2.2.4. Transmitter out of band spurious emission test

Notes:

1. The models listed in this report are described on CSA reports 80034168 and 80203034 to following standards: CSA C22.2 No.107.1-16 (Reaffirmed 2021), CSA C22.2 No.330-23, UL 1741, UL 1741 CRD, UL 1699B.
2. The PVRSE communication devices Model: 1PN6K Version 1.1 for the 3.8KW to 6 KW models were evaluated on reports 80041092 and this current report 80203040 covers 7.7KW and 10KW models.
3. The PVRSE module is an integral part of the inverter.

MARKINGS

This letter of attestation does not authorize the use of the CSA mark on the subject products. Quotations from the test report or the use of the name CSA group or its registered trademark, in any way, is not permitted without prior written consent of CSA Group Testing & Certification Inc.

ALTERATIONS

None

FACTORY TESTS

Not Applicable

DESCRIPTION

Primo GEN24 3.8 208-240, Primo GEN24 3.8 208-240 Plus, Primo, GEN24 5.0 208-240, Primo GEN24 5.0 208-240 Plus, Primo GEN24 6.0 208-240, Primo GEN24 6.0 208-240 Plus, Primo GEN24 7.7 208-240, Primo GEN24 7.7 208-240 Plus; Primo GEN24 10.0 208-240 and Primo GEN24 10.0 208-240 Plus. Models ranging from 3.8KW to 6KW share the same construction, and those from 7.7KW to 10KW are constructed identically. Different ac voltages (208, 220 & 240) and power levels are controlled by firmware.

PVRSE 1PN6K, V1.1 is embedded in models ranging from 3.8KW to 6KW
PVRSE 1PN10K, V0.6 is embedded in models ranging from 7KW to 10KW

TEST HISTORY

Edition: 1 (Project 80203040)

Include previously evaluated models under Attestation Report 80041092.

Attestation of a PVRSE P.N. 1PN10K, V0.6 integral to the following Interactive PV Inverter Series:

Primo GEN24 7.7 208-240
Primo GEN24 7.7 208-240 Plus
Primo GEN24 10.0 208-240
Primo GEN24 10.0 208-240 Plus.

The subject matter was evaluated on the representative model Primo GEN24 10.0 208-240 with satisfactory results, according to following specifications:

SUNSPEC Alliance – Communication Signal for Rapid Shutdown Test Specification - Version 19 (April 20, 2021)

Clause	Test
2.2.1.	Modulation accuracy test
2.2.2.	Transmitter output level test and transmitter output impedance
2.2.3.	Transmitter in band spurious emission test
2.2.4.	Transmitter out of band spurious emission test

The tests were witnessed and conducted under the CSA SMTC program at the client's facility:

Fronius International GmbH
Guenter Fronius Strasse 1
Wels-Thalheim Upper Austria 4600
Austria

A copy of the original Sunspec Test Report is stored in the Project Folder in CSA Group.

---End of Report---

TÜVRheinland®

Date: 2024-12-11

Shenzhen BYD Electronics Co., Ltd.
Room 301 of BYD A-4 Building,
No.1 Yan'an Road, Kuichong Street,
Dapeng New District Shenzhen
518119 Guangdong
P.R. China

Ref: CU US + Canada Certificate

Type of Equipment	:	Energy Storage System
Certificate No.	:	CU 72407590 0001
Report No.	:	CN240X0C 001
Engineer/Contact	:	Andy Chen
Standards	:	ANSI/CAN/UL 9540:2023

Dear Madame or Sir,

The above referenced technical equipment has been tested and was found to be in compliance with the listed test requirement(s). Enclosed, please find the TUV Rheinland approval document No. CU 72407590 0001.
It authorizes you to label the listed product(s) with the TUV Rheinland Mark identified in the approval document. For compliance, the Test Mark must be on the approved unit.

Your product is subject to regular factory follow-up inspections as well as annual certificate and factory registration fees.

In using the TUV Rheinland Mark you are obligated to comply with the TUV Rheinland of North America Service Agreement.

If we can be of any further assistance to you, please do not hesitate to contact us.

With kind regards,

Certification Body

Weichun Li

Enclosure

Certificate

Certificate no. CU 72407590 0001

License Holder:

Shenzhen BYD Electronics Co., Ltd.
Room 301 of BYD A-4 Building,
No.1 Yan'an Road, Kuichong Street,
Dapeng New District Shenzhen
518119 Guangdong
P.R. China

Manufacturing Plant:

Shenzhen BYD Electronics Co., Ltd.
Room 301 of BYD A-4 Building,
No.1 Yan'an Road, Kuichong Street,
Dapeng New District Shenzhen
518119 Guangdong
P.R. China

Report Number: CN240X0C 001 **Client Reference:** 168495180

Certification acc. to: ANSI/CAN/UL 9540:2023

Product Information

Certified Product: Energy Storage System

Model Designation:
1)Fronius-Primo-GEN24-208-240-Plus-10.0-ESS-HVM-us,
2)Fronius-Primo-GEN24-208-240-Plus-7.7-ESS-HVM-us,
3)Fronius-Primo-GEN24-208-240-Plus-6.0-ESS-HVM-us,
4)Fronius-Primo-GEN24-208-240-Plus-5.0-ESS-HVM-us,
5)Fronius-Primo-GEN24-208-240-Plus-3.8-ESS-HVM-us,
6)Fronius-Primo-GEN24-208-240-10.0-ESS-HVM-us,
7)Fronius-Primo-GEN24-208-240-7.7-ESS-HVM-us,
8)Fronius-Primo-GEN24-208-240-6.0-ESS-HVM-us,
9)Fronius-Primo-GEN24-208-240-5.0-ESS-HVM-us,
10)Fronius-Primo-GEN24-208-240-3.8-ESS-HVM-us

Technical Data:
ESS type:
Electrochemical ESS/AC ESS/Multi-part ESS Energy:
11.04kWh/13.8kWh /16.56kWh /19.32kWh
(Based on Battery system combined)
Input & output ratings:
1)Primo GEN24 10.0 208-240 Plus
2)Primo GEN24 10.0 208-240
3)Primo GEN24 7.7 208-240 Plus
4)Primo GEN24 7.7 208-240
5)Primo GEN24 6.0 208-240 Plus
6)Primo GEN24 6.0 208-240
7)Primo GEN24 5.0 208-240 Plus
8)Primo GEN24 5.0 208-240
9)Primo GEN24 3.8 208-240 Plus
10)Primo GEN24 3.8 208-240
(Based on Inverter constructed)

Remarks: Other Data: See Appendix (Constr. Data Form)

Appendix: 1

TUV Rheinland of North America, Inc.
400 Beaver Brook Rd, Boxborough, MA 01719
Tel +1 (978) 266 9500, Fax +1 (978) 266-9992

Certificate

Certificate no. CU 72407590 0001

License Holder:
Shenzhen BYD Electronics Co., Ltd.
Room 301 of BYD A-4 Building,
No.1 Yan'an Road, Kuichong Street,
Dapeng New District Shenzhen
518119 Guangdong
P.R. China

Manufacturing Plant:
Shenzhen BYD Electronics Co., Ltd.
Room 301 of BYD A-4 Building,
No.1 Yan'an Road, Kuichong Street,
Dapeng New District Shenzhen
518119 Guangdong
P.R. China

Date of issue: 2024-12-11
(yr/mo/day)

TUV Rheinland of North America, Inc.
400 Beaver Brook Rd, Boxborough, MA 01719
Tel +1 (978) 266 9500, Fax +1 (978) 266-9992

SunSpec Modbus CERTIFIED

THE SUNSPEC ALLIANCE HEREBY CERTIFIES THAT

Fronius International GmbH

PRODUCT NAME

Primo GEN24 6.0 208-240 Plus

PRODUCT MODELS

GEN24 3.8 208-240, GEN24 5.0 208-240, GEN24 6.0 208-240, GEN24 7.7 208-240, GEN24 10.0 208-240

GEN24 3.8 208-240 Plus, GEN24 5.0 208-240 Plus, GEN24 6.0 208-240 Plus, GEN24 7.7 208-240 Plus, GEN24 10.0 208-240 Plus

CATEGORY

Inverter

Has been issued this SunSpec Certified Product Award for Successful Testing and Certification of the

SUNSPEC INFORMATION MODELS

1, 701, 702, 703, 704, 706, 707, 708, 709, 710, 711, 712, 713

AWARDED ON

December 2, 2024

CERTIFICATE NUMBER

SM-000039

Tom Tansy, Chairman

SUNSPEC ALLIANCE