



Letter of Attestation

Document: 80261284

Master Contract: 300612

Project: 80261284

Date Issued: 2025-08-14

Issued to: GoodWe Technologies Co., Ltd.
No.90, Zijin Road, New District
Suzhou, Jiangsu 215011
China
Attention: Yu Xiao

*CSA Group hereby confirms that it has completed an evaluation of:
Bi-directional, transformerless Utility Interactive Inverter, Model GW12K-ET-LL-G10, with
PV input or battery input, with Stand-Alone mode or Grid Support Utility Interactive mode,
wall mounted, permanently connected.*

*CSA Group hereby attests that the products identified above and described
in test report 80261284 dated August 14, 2025
complies with the following standards/tests, to the extent applicable:*

*CSA-C22.2 No. 107.1-16 - Power Conversion Equipment
*UL Std. No. 1741 - Inverters, Converters, Controllers and
Interconnection System Equipment for Use With
Distributed Energy Resources (Third Edition,
Revision April 22, 2025)*

**Note: Conformity to UL 1741- Third Edition (April 22, 2025) includes compliance with applicable
requirements of IEEE 1547-2003(R2008), IEEE 1547.1-2005 (R2011).*

UL 1741- Third Edition (April 22, 2025)

- 1. Clause 48.2&48.3- Output Ratings & DC Input Range*
- 2. Clause 46- Temperature Test*
- 3. Clause 47- Dielectric Voltage Withstand Test*
- 4. Clause 31- Class 2 Circuit Analysis*
- 5. Clause 60- Capacitor Discharge*
- 6. Clause 50.3-Short-Circuit Test*
- 7. Clause 50.4- Reverse Polarity Test (DC Miswiring)*
- 8. Clause 50.6-Component short- and open- circuit Test*
- 9. Clause 50.8-Loss of Control Circuit*
- 10. Clause 51- Grounding Impedance Test*



Document: 80261284

Project: 80261284

Master Contract: 300612

Date: August 14, 2025

11. Clause 62- Static Load Test

IEEE 1547.1-2005 (R2011)

- 1. Clause 5.1- Temperature Stability test**
- 2. Clause 5.2- Test for response to abnormal voltage conditions**
- 3. Clause 5.3- Response to abnormal frequency conditions**
- 4. Clause 5.4- Synchronization**
- 5. Clause 5.5.1- Protection from electromagnetic interference (EMI) test**
- 6. Clause 5.5.2- Surge withstand performance test**
- 7. Clause 5.5.3- Dielectric test for paralleling device**
- 8. Clause 5.6- DC Injection Measurements**
- 9. Clause 5.7- Anti-Islanding Test**
- 10. Clause 5.9- Open Phase Test**
- 11. Clause 5.10- Reconnect following abnormal condition disconnect**
- 12. Clause 5.11- Harmonic Distortion**

Rita Ren
Issued by: Rita Ren

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.

MASTER CONTRACT: 300612

REPORT: 80261284

PROJECT: 80261284

Edition 1: August 14, 2025; Project 80261284 - Kunshan

Prepared By: Rita Ren

Authorized By: Rohana Yang

Contents: Letter of Attestation - Page 1 to 2
Description and Tests - Pages 1 to 7
Att1 Illustrations - 1 to 52

PRODUCTS

Bi-directional, transformerless Utility Interactive Inverter, Model GW12K-ET-LL-G10, with PV input or battery input, with Stand-Alone mode or Grid Support Utility Interactive mode, wall mounted, permanently connected, ratings as following:

Technical Data	GW12K-ET-LL-G10
Battery Input	
Battery Type	LFP (LiFePO ₄) /Lead-acid
Nominal Battery Voltage (V)	48
Battery voltage range (V)	40~60
Start-up Voltage(V)	30
Number of Battery Input	1
Max. Continuous Charging Current (A)	250
Max. Continuous Discharging Current (A)	250
Max Charging Power (kW)	12.0
Max Discharging Power (kW)	13.2
PV Input	
Max. Input Power (kW)	24
Max. Input Voltage (V)	1000
MPPT Operating Voltage Range (V)	150-850V
MPPT Operating Voltage Range at Nominal Power (V)	300~850
Start-up Voltage (V)	180
Nominal Input Voltage (V)	620
Max. MPPT Current (A)	20/20/20
Max. MPPT Short Circuit Current(A)	26/26/26
Number of MPPTs	3
Number of Strings per MPPT	1/1/1
AC Output (On-grid)	

The reader is responsible for any liability arising from actions taken in interpreting or applying the results presented in this report. This report shall not be reproduced except in full, without written approval from CSA Group Testing & Certification Inc. The results of this report only relate to those items tested.

Nominal Power (kW)	12.0
Max. Power (kW)	12.0
Nominal Power at 40 °C(kW)	12.0
Max. Power at 40 °C (kW)*1	12.0
Nominal Apparent Power Output to Grid (kVA)	12.0
Max. Apparent Power to Utility Grid (kVA)	13.2
Nominal Apparent Power from Grid(kVA)	12.0
Max. Apparent Power from Grid (kVA)	26.7
Nominal Voltage (V)	220/127, 3L/N/PE
Voltage Range (V)	170~290
Nominal Frequency (Hz)	60
Max. Current to Grid (A)	31.5@127V
Max. Current From Grid (A)	70
Nominal Current From Grid (A)	31.5@127V
Max. Output Fault Current (Peak and Duration) (A)	99
Inrush Current (Peak and Duration) (A)	300A/2mS
Nominal Current to Grid (A)	31.5@127V
Power Factor	~1 (Adjustable from 0.8 leading~0.8 lagging)
Maximum Output Overcurrent Protection (A)	70
Back-up Side	
Nominal Output Apparent Power (kVA)	12
Max. Output Apparent Power with Grid (kVA)	26.7
Nominal Output Current (A)	31.5@127V
Max Output Current(Byapss)	70
Max. Fault Current (Peak and Duration) (A)	99A/100ms
Inrush Current (Peak and Duration) (A)	300A/2ms
Maximum Overcurrent Protection (A)	70
Nominal Output Voltage (V)	220/127, 3L/N/PE
Nominal Output Frequency (Hz)	60
Generator Side	
Nominal Apparent Power(kVA)	12
Max. Apparent Power(kVA)	12
Nominal Voltage (V)	220
Input Voltage Range (V)	170~290
Nominal Frequency (Hz)	60
Max. Current (A)	31.5
General Data	
Operating Temperature Range (°C)	-35~+60 (derating>45°C)
Operating Environment	Outdoor
Relative Humidity	0~95%
Max. Operating Altitude (m)	4000
Communication Protocols	Modbus RTU(RS485), Modbus TCP/IP(Ethernet), Sunspec Modbus RTU
Dimension (W×H×D mm)	756*551*258mm
Noise Emission (dB)	<45

Topology	Non-isolated
Ingress Protection Rating	IP66
Anti-corrosion Class	C4
DC Connector	MC4
AC Connector	Tube Terminal
Environmental Category	4K4H
Pollution Degree	III
Overvoltage Category	DC II / AC III
Protective Class	I
Storage Temperature (°C)	-40~+85
Decisive Voltage Classification (DVC)	Battery: A PV: C AC: C Com: A
Mounting Method	Wall Mounted

Note:

- The Utility Interconnection Voltage and Frequency Trip Limits and Trip Times setting compliance as following:

Voltage and frequency limits for utility Interaction

Condition	Simulated utility source		Maximum time (sec) at 60 Hz before cessation of current to the simulated utility
	Voltage (V)	Frequency (Hz)	
A	< 50% V	Rated (60 Hz)	0.16
B	50% V ≤ V < 88% V	Rated (60 Hz)	2
C	110% V < V < 120% V	Rated (60 Hz)	1
D	120% V ≤ V	Rated (60 Hz)	0.16
E	Rated	f > 60.5	0.16
F	Rated	f < 59.3	0.16

- Reconnect voltage and frequency after abnormal trip:

	Under voltage	Overvoltage
Reconnect Voltage	193.6	242
Reconnect Frequency	59.3	60.5
Reconnect Time Delay	300s	

- Manufacture specified accuracy:

Voltage:	± 2.2V
Frequency:	± 0.05 Hz
Time:	+/-1% but not less than 100ms

- The Utility Interactive performance are evaluated on the following version software:

Inverter Model	MICROPROCESSOR/FPGA	FIRMWARE	CHECKSUM
GW12K-ET-LL-G10	F28P550SG8PZR	010101	190-20148-00
	STM32H745IIT3		

- Tests were performed with following sequence required and suggested by IEEE 1547-2003 (R2008):

Table 4—Sequence for conducting design test

Required order	Design test clause and title
1	5.1.1 Response to abnormal voltage and frequency
2	5.1.2 Synchronization
3	5.1.3 Interconnect integrity test
Suggested order	
4	5.1.1 Response to abnormal voltage and frequency
5	5.1.2 Synchronization
6	5.1.4 Unintentional islanding
7	5.1.5 Limitation of dc injection
8	5.1.6 Harmonics

Conditions of Acceptability:

1. With a limited design, the Dielectric Voltage Withstand Test test conditions only meet the relevant test requirements of IEC 62109. The capacity of withstanding high voltage was verified at the value of 2120V between AC/DC to chassis and 3400Vdc between AC/DC to control circuits for one minute, which is the highest voltage the unit could withstand. The specific test conditions are shown in the Attachment of Test data.

APPLICABLE REQUIREMENTS

CSA-C22.2 No. 107.1-16 - Power Conversion Equipment

*UL Std. No. 1741 - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources (Third Edition, Revision April 22, 2025)

*Note: Conformity to UL 1741- Third Edition (April 22, 2025) includes compliance with applicable requirements of IEEE 1547-2003(R2008), IEEE 1547.1-2005 (R2011).

TEST HISTORYProject 80261284

Bi-directional, transformerless Utility Interactive Inverter, Model GW12K-ET-LL-G10, was performed as representative at GoodWe Technologies Co.Ltd. under CSA WMTC program and witnessed by a representative from CSA Kunshan Office.

TEST PERFORMED	REFERENCE		Pass/Fail / NA
Output Ratings	UL1741	48.2	Performed on model GW12K-ET-LL-G10 with acceptable result
DC Input Range	UL1741	48.3	
Temperature Test	UL1741	46	Performed on model GW12K-ET-LL-G10 with acceptable result
Dielectric Voltage Withstand Test	UL1741	47	Performed on model GW12K-ET-LL-G10 with acceptable result
	IEEE1547.1	5.5.3	
Class 2 Circuit Analysis	UL 1741	31	Performed on model GW12K-ET-LL-G10 with acceptable result
Capacitor Discharge	UL 1741	60	Performed on model GW12K-ET-LL-G10 with acceptable result
Short-Circuit Test	UL1741	50.3	Performed on model GW12K-ET-LL-G10 with acceptable result
Reverse Polarity Test (DC Miswiring)	UL 1741	50.4	Performed on model GW12K-ET-LL-G10 with acceptable result
Component short- and open- circuit Test	UL1741	50.6	Performed on model GW12K-ET-LL-G10 with acceptable result*
Loss of Control Circuit	UL1741	50.8	Performed on model GW12K-ET-LL-G10 with acceptable result
Grounding Impedance Test	UL1741	51	Performed on model GW12K-ET-LL-G10 with acceptable result
Static Load Test	UL 1741	62	Performed on model GW12K-ET-LL-G10 with acceptable result
Temperature Stability test	IEEE1547.1	5.1	Performed on model GW12K-ET-LL-G10 with acceptable result
Utility Voltage and Frequency Variation Test, for adjustable settings, Response to abnormal voltage and frequency (before Surge/EMI)	IEEE1547.1	5.2, 5.3	Performed on model GW12K-ET-LL-G10 with acceptable result

TEST PERFORMED	REFERENCE		Pass/Fail / NA
Synchronization (before Surge/EMI)	IEEE1547.1	5.4	Performed on model GW12K-ET-LL-G10 with acceptable result
Protection from electromagnetic immunity (EMI): Radiated Immunity	IEEE1547.1	5.5.1	Performed on model GW12K-ET-LL-G10 with acceptable result*
Surge Withstand Performance Test	IEEE1547.1	5.5.2	Performed on model GW12K-ET-LL-G10 with acceptable result*
Utility Voltage and Frequency Variation Test, for adjustable settings, Response to abnormal voltage and frequency (after Surge/EMI and at extreme temperature)	IEEE1547.1	5.2, 5.3	Performed on model GW12K-ET-LL-G10 with acceptable result
Synchronization (after Surge/EMI)	IEEE1547.1	5.4	Performed on model GW12K-ET-LL-G10 with acceptable result
DC Injection Measurements	IEEE1547.1	5.6	Performed on model GW12K-ET-LL-G10 with acceptable result
Anti-Islanding Test	IEEE1547.1	5.7	Performed on model GW12K-ET-LL-G10 with acceptable result
Open Phase Test	IEEE1547.1	5.9	Performed on model GW12K-ET-LL-G10 with acceptable result
Reconnect Time Delay	IEEE1547.1	5.10	Performed on model GW12K-ET-LL-G10 with acceptable result
Harmonic Distortion	IEEE1547.1	5.11	Performed on model GW12K-ET-LL-G10 with acceptable result

*Note:

With a limited design, the EMC test conditions only meet the relevant test requirements of IEC 61000. The specific test conditions are shown in the Attachment of Test data.

Equipment List:

No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Due Date
1	Power Analyzer	YOKOGAWA	WT1805E	C2XF23008V	2026/03/06
2	Current Probe	CYBERTEK	CP0500A	C2080000197	2025/09/24
3	Current Probe	CYBERTEK	CP0500A	C2080000195	2025/09/24
4	Current Probe	CYBERTEK	CP0150A	C2180001569	2025/09/25
5	Voltage probe	CYBERTEK	VP5205A	D2160001222	2025/09/23
6	Voltage probe	CYBERTEK	VP5205A	D2160001170	2025/09/23
7	Voltage probe	CYBERTEK	VP5205A	D1960001419	2025/09/25
8	Osilloscope	KEYSIGHT	DSOX3024T	MY57181537	2026/03/05
9	AC Source	Chrome	61860	618603800448	/
10	DC Source	KEYSIGHT	N8957APV	DE20024949	/
11	Battery Simulator	AIKE	0-1000V, 0-267A, 80kW	FHDCS4-1K/80C	/
12	Safety Tester	ECC	SE7452	1711283	2026/04/18
13	Datalogger	KEYSIGHT	34972A	MY49029451	2025/09/23
14	Chamber	ESPEC	GPS-3	GCL-RD-405	2026/04/21
15	RLC Load	Qunling	ACLT-3830H	93H001468	/

---End of Report---