G3-PLC CERTIFIED FCC

C E R T I F I C A T E

Certificate registration number: G3.2312.595.2.C6

Certificate holder: Hexing Electrical Co., Ltd.

Product designation: HXP100DII,
Hardware version PHXP100DII.R410, Firmware version 5.0

Certification date: December 15th 2023

This certificate indicates the above-mentioned product successfully completed certification testing with regards to the G3-Alliance reference specification 06/2021. The optional feature coherent mode of the G3 protocol is also covered by this certification.

The certificate applies to certification profile FCC Multipurpose Worldwide and the device was configured as a PAN-Device.

Test cases have been performed as described in the test report referred to below. This certificate is granted on account of tests conducted by TÜV Rheinland in Yokohama, Japan in December 2023. The results and remarks can be found in the complete test report.

Applied tests	Performed by	Document evidence
Conformance, interoperability and performance testing according to the test specification referenced by the test report	TÜV Rheinland Japan	JP23IE6U 001

The device tested is a G3-PLC FCC 1-phase meter. The meter is equipped with the G3-PLC certified platform ENV-EV8010-QFN56-1PHASE-A2 with certificate no. G3.2209.535.1.C6. The Protocol Implementation Conformance Statement in the Annex includes the PICS related to performance and is an integral part of this certificate. This certificate is valid from December 15th 2023.

The certificate is only applicable to the product described above and permits the use of the G3-PLC certification logo as laid down in the G3-Alliance logo license agreement.

This certificate does not imply assessment of the production. This certificate shall not be defined, or used as a guarantee covering quality of a product which includes G3-PLC. The liability of the Alliance and the test laboratory or any of her representatives is excluded for any damages or losses of the certified company.

Paris, December 15th 2023

For the G3-Alliance:

Marc Delandre
Chairman

Madeleine Francillard
Chair Certification Program

G3-Alliance

Annex 1: Protocol Implementation Conformance Statement (PICS)

Feature implementation statement

Name	Value	Description
BAND_PLAN	FCC	Indicates whether the band-plan supported by the device
BAND_PLAN_RF	N/A	Indicates whether the RF band plan(s) supported by the device
FEATURE_HYBRID_RF	FALSE	Indicates whether Hybrid PLC+RF feature is supported
FEATURE_PAN_ COORDINATOR	FALSE	Indicates whether the device is a PAN-Coordinator (true) or a normal device (false)
FEATURE_COHERENT_ MODULATION	TRUE	Indicates whether coherent modulation is supported
FEATURE_EAP_SERVER	FALSE	Indicates whether an EAP-PASK server is implemented by the DUT Apply only if FEATURE_PAN_COORDINATOR = true
FEATURE_D8PSK_ MODULATION	TRUE	Indicates whether D8PSK modulation is supported
FEATURE_ROUTING	TRUE	Indicates whether the routing is implemented by the IUT
FEATURE_SECURITY	F1	Indicates whether the security implemented by the device. Possible values are: F1, F2
FEATURE_ACTIVE_SCAN	TRUE	Indicates whether the active scan process is done by the IUT after power-up
FEATURE_PREAMBLE_ COEXISTENCE_MECHANISM	FALSE	Indicates whether the preamble-based coexistence mechanism is used by the IUT

Annex 2: Protocol Implementation Conformance Statement (PICS)

PICS related to performance (1/2)

The device tested is a G3-PLC FCC 1-phase meter communicating on phase 1.
Testing was performed on phase 1.

Operating voltage applied for certification testing was AC230V/50Hz.

Name	Value	Unit	Description
PHY_001_SIGNAL_LEVEL	80	dBµV	Indicate the signal level that can be injected in the band, on a 2 Ohms LISN
PHY_002_SIGNAL_LEVEL	90	dBµV	Indicate the signal level that can be injected in the band, on a CISPR16-1 LISN
PHY_003_SNR_ROBO_D	1	dB	SNR level of white noise that can be supported with a FER < 5% for ROBO modulation in differential mode.
PHY_003_SNR_DBPSK	5	dB	SNR level of white noise that can be supported with a FER < 5% for DBPSK modulation in differential mode.
PHY_003_SNR_DQPSK	8	dB	SNR level of white noise that can be supported with a FER < 5% for DQPSK modulation in differential mode.
PHY_003_SNR_D8PSK	12	dB	SNR level of white noise that can be supported with a FER < 5% for D8PSK modulation in differential mode.
PHY_003_SNR_ROBO_C	0	dB	SNR level of white noise that can be supported with a FER < 5% for ROBO modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_003_SNR_BPSK	3	dB	SNR level of white noise that can be supported with a FER < 5% for BPSK modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_003_SNR_QPSK	6	dB	SNR level of white noise that can be supported with a FER < 5% for QPSK modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_003_SNR_8PSK	10	dB	SNR level of white noise that can be supported with a FER < 5% for 8PSK modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_005_NOISE_DURATION_ROBO_D	950	µs	Duration of the impulsive noise that can be supported with a FER < 5% for ROBO modulation in differential mode.

Annex 2: Protocol Implementation Conformance Statement (PICS)

PICS related to performance (2/2)

Name	Value	Unit	Description
PHY_005_NOISE_DURATION_DBPSK	300	µs	Duration of the impulsive noise that can be supported with a FER < 5% for DBPSK modulation in differential mode.
PHY_005_NOISE_DURATION_DQPSK	80	µs	Duration of the impulsive noise that can be supported with a FER < 5% for DQPSK modulation in differential mode.
PHY_005_NOISE_DURATION_D8PSK	25	µs	Duration of the impulsive noise that can be supported with a FER < 5% for D8PSK modulation in differential mode.
PHY_005_NOISE_DURATION_ROBO_C	800	µs	Duration of the impulsive noise that can be supported with a FER < 5% for ROBO modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_005_NOISE_DURATION_BPSK	300	µs	Duration of the impulsive noise that can be supported with a FER < 5% for BPSK modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_005_NOISE_DURATION_QPSK	200	µs	Duration of the impulsive noise that can be supported with a FER < 5% for QPSK modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_005_NOISE_DURATION_8PSK	60	µs	Duration of the impulsive noise that can be supported with a FER < 5% for 8PSK modulation in coherent mode. Apply only if FEATURE_COHERENT_MODULATION is true.
PHY_007_SNR	0	dB	Indicate the SNR level that can be supported by the DUT so PHY header (FCH) are correctly decoded (with less than 10% of loss)
PHY_008_SIGNAL_LEVEL	60	dBµV	Indicate the signal level of a frame that can be received correctly by the DUT (with FER<10%)
PHY_009_LQI_MIN_RANGE	40	-	Lower value of LQI to be tested during test PHY_009
PHY_009_LQI_MAX_RANGE	100	-	Higher value of LQI to be tested during test PHY_009
BOOTSTRAP_001_DURATION	150	ms	Duration needed for the DUT to reply to bootstrap messages EAP-PSK #1 and #3. Apply only if FEATURE_DEVICE_TYPE = PAN-Device
BOOTSTRAP_002_DURATION	n/a	ms	Duration needed for the DUT to reply to bootstrap messages joining, EAP-PSK #2 and #4. Apply only if FEATURE_EAP_SERVER is true
BOOTSTRAP_003_DURATION	150	ms	Duration needed for the DUT to relay bootstrap messages. Apply only if FEATURE_DEVICE_TYPE = PAN-Device
TONE_MAP_001_FER	5	%	The Frame Error Rate that can be expected when applying the tone-map configuration provided by the DUT
TONE_MAP_002_DATARATE_1	500	bits/s	The data-rate that can be expected when applying the tone-map configuration provided by the DUT in situation #1
TONE_MAP_002_DATARATE_2	500	bits/s	The data-rate that can be expected when applying the tone-map configuration provided by the DUT in situation #2
TONE_MAP_002_DATARATE_3	500	bits/s	The data-rate that can be expected when applying the tone-map configuration provided by the DUT in situation #3
TONE_MAP_002_DATARATE_4	500	bits/s	The data-rate that can be expected when applying the tone-map configuration provided by the DUT in situation #4
MESH_ROUTING_001_DURATION	125	ms	Duration needed for the DUT to relay short mesh routed data frames
MESH_ROUTING_002_DURATION	250	ms	Duration needed for the DUT to relay maximum size mesh routed data frames

Annex 3:
Copy of test report cover sheet

Test Report – Products
Prüfbericht - Produkte

TÜVRheinland®

Test report no.: *Prüfbericht-Nr.:*	**JP23IE6U 001**	**Order No.:** *Auftragsnr.:*	150284550 20	Page 1 of 54 *Seite 1 von 54*
Client reference no.: *Kunden-Referenz-Nr.:*	HXP100DII	**Order date:** *Auftragsdatum:*	2023-12-01	
Client: *Auftraggeber:*	Hexing Electrical Co., Ltd. 1418 Moganshan Road, Shangcheng Industrial Zone, 310011, Hangzhou City, China			
Test item: *Prüfgegenstand:*	Meter			
Identification / Type no.: *Bezeichnung / Typ-Nr.:*	HXP100DII			
Order content: *Auftrags-Inhalt:*	G3 Certification Test			
Test specification *Prüfgrundlage:*	G3-Alliance - Conformance Tests Suite Specification - v0.37 G3-Alliance - 1to1-PHY-Interoperability-Tests-Specification-v0.14 G3-Alliance - Performance Test Suite Specification - v0.27 G3-Certification Test Procedures version 6.02			

Date of sample receipt: *Wareneingangsdatum:*	2023-11-30
Test sample no: *Prüfmuster-Nr.:*	A003613584-001
Testing period: *Prüfzeitraum:*	2023-12-01 - 2023-12-08
Place of testing: *Ort der Prüfung:*	4-25-2 Kita-Yamata, Tsuzuki-ku Yokohama 224-0021, Japan
Testing laboratory: *Prüflaboratorium:*	TÜV Rheinland Japan Ltd.
Test result*: *Prüfergebnis*:*	Pass

tested by: *geprüft von:*		**authorized by:** *genehmigt von:*	
Date: 2023-12-08 *Datum:*	Martin Zietz	**Issue date:** 2023-12-11 *Ausstellungsdatum:*	Shuji Saito
Position / *Stellung:*	Tester	**Position** / *Stellung:*	Reviewer

Other:
Sonstiges:

Condition of the test item at delivery: *Zustand des Prüfgegenstandes bei Anlieferung:* Test item complete and undamaged / Prüfmuster vollständig und unbeschädigt

* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet

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Annex 4: Additional details of the platform on which the product is based

Platform model name on which product is based:	ENV-EV8010-QFN56-1PHASE-A2
G3-Alliance platform certificate number:	G3.2209.535.1.C6
Exact part number of all the chips running G3 stack in the certified platform:	EV8010IMLTRT
What each part number runs: lower MAC (incl. CSMA/CA) or PHY or other parts of the stack:	PHY,MAC and 6LowPAN
Hardware version of this chip:	EV8010IMLTRT
Software version running on this chip:	5.0
Internal CPU frequency:	240 MHz