

Compliance Document

No. D 005028 0357 Rev. 00

Holder of Certificate: **Anker Innovations Limited**
Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok
Kowloon
HONG KONG

Product: **Converter**
(PV grid-connected inverter)

Model(s): **A5140, A5141**

Parameters: See page 2

Tested according to: VDE-AR-N 4105:2018
DIN VDE V 0124-100 (VDE V 0124-100):2020

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 64290203026601B

Date, 2023-01-19



(Billy Qiu)

Compliance Document

No. D 005028 0357 Rev. 00

Parameters:

| | | |
|-----------------------------------|-------------------|-------------------|
| Model: | A5141 | A5140 |
| PV input parameters: | | |
| Maximum input power | 1200 W | 1200 W |
| Maximum input voltage | 60 Vd.c. | 60 Vd.c. |
| Rated input voltage | 20 - 60 Vd.c. | 20 - 60 Vd.c. |
| MPPT voltage range | 22 - 55 Vd.c. | 22 - 55 Vd.c. |
| Maximum input current | 17 Ad.c. x 2 | 14 Ad.c. x 2 |
| Isc PV | 20 Ad.c. x 2 | 20 Ad.c. x 2 |
| AC output rating | | |
| Rated output voltage | 230 Va.c. | 230 Va.c. |
| Rated output frequency | 50 Hz | 50 Hz |
| Maximum continuous output current | 3.26 Aa.c. | 2.61 Aa.c. |
| Maximum output active power | 750 W | 600 W |
| Maximum output apparent power | 750 VA | 600 VA |
| Power factor range | 0.95 un - 0.95 ov | 0.95 un - 0.95 ov |

Compliance Document

No. D 005028 0357 Rev. 00

| Unit Certificate | | |
|--|---|---------------|
| Manufacturer | Anker Innovations Limited | |
| Power generation unit type | [Inverter]: <u>A5141, A5140</u> Remark: certified on representative model A5141 of family design products, results of the measurement of A5141 can be transferred to other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020. | |
| Technical data | Max. active power $P_{E_{max}}$ | 750W (A5141) |
| | Max. apparent power $S_{E_{max}}$ | 759VA (A5141) |
| | Rated voltage | 230Va.c. |
| | Rated current (AC) I_r | 3.26A (A5141) |
| | Initial short-circuit AC current | 9.6A (A5141) |
| Network connection rule | VDE-AR-N 4105 “Generators connected to the low-voltage distribution network” Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network | |
| Test requirement | DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network | |
| Test report | 64.290.20.30266.01BB from 16.01.2023 | |
| The above designated power generation unit meets the requirements of VDE-AR-N 4105 | | |
| This unit certificate includes extract report information of E.5 of VDE-AR-N 4105 for the power generation unit(s) | | |



Compliance Document

No. D 005028 0357 Rev. 00

| Certificate of NS protection | |
|--|---|
| Manufacturer | Anker Innovations Limited |
| Type of NS protection | Integrated NS protection |
| Central NS protection | No |
| Integrated NS protection | Yes Assigned to power generation unit of type: <u>A5141, A5140</u> |
| Network connection rule | VDE-AR-N 4105 “Generators connected to the low-voltage distribution network” Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network |
| Test requirement | DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network |
| Test report | 64.290.20.30266.01BB from 16.01.2023 |
| The network and system protection designated above meets the requirements of VDE-AR-N 4105. | |
| This certificate of NS protection includes extract report information of E.7 of VDE-AR-N 4105 for the NS protection. | |

Compliance Document

No. D 005028 0357 Rev. 00

E.5 Test report “Network interactions” for power generation units

| | | | | | | |
|--|--|-------------------------------|-------|-----|-----|-----|
| Extract of the test report for power generation units “Determination of electrical properties” | | No.: 64.290.20.30266.01B | | | | |
| System manufacturer: | Anker Innovations Limited | | | | | |
| Manufacturer indications: | System type (BHKW, PV-WR, ...): PV grid-connected inverter | | | | | |
| A5141 | Max. active power $P_{E_{max}}$ (W) | 750 | | | | |
| | Max. apparent power $S_{E_{max}}$ (VA) | 759 | | | | |
| | Rated voltage (Va.c.) | 230 | | | | |
| A5140 | Max. active power $P_{E_{max}}$ (W) | 598 | | | | |
| | Max. apparent power $S_{E_{max}}$ (VA) | 602 | | | | |
| | Rated voltage (Va.c.) | 230 | | | | |
| Measurement period | 2020-04-26 to 2021-09-26 | | ----- | | | |
| | | | | | | |
| Connection without provisions (regarding the primary energy carrier) | | $k_i = \underline{0.37}$ | | | | |
| Most adverse case when switching between generator levels | | $k_i = \underline{0.64}$ | | | | |
| Connection at nominal conditions (of the primary energy carrier) | | $k_i = \underline{0.43}$ | | | | |
| Disconnection at rated power | | $k_i = \underline{1.15}$ | | | | |
| Worst value of all switching operations | | $k_{imax} = \underline{1.15}$ | | | | |
| | | | | | | |
| Flicker | Network impedance angle Ψ_k | 32° ^{a)} | 30° | 50° | 70° | 85° |
| | Initial flicker factor c_ψ | 2.15 | -- | -- | -- | -- |
| Remark: ^{a)} According to VDE V 0124-100, the worst case is measured at 32° network impedance angle and the other angles are waived. | | | | | | |

Compliance Document

No. D 005028 0357 Rev. 00

| Harmonics and inter-harmonics & Feed-in of direct currents | | | | | | | | | | | | |
|--|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------------|
| Harm on. Nr. | P/P _{E_{max}} | | | | | | | | | | | Limit (A) |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | |
| 0 | 0.002 | -0.010 | -0.007 | -0.015 | -0.011 | -0.009 | -0.016 | -0.007 | -0.006 | 0.003 | -0.012 | 0.5% I _R |
| 1 | 0.001 | 0.383 | 0.597 | 1.017 | 1.387 | 1.584 | 2.064 | 2.249 | 2.742 | 3.039 | 3.217 | - |
| 2 | 0.000 | 0.018 | 0.010 | 0.012 | 0.021 | 0.018 | 0.010 | 0.026 | 0.034 | 0.011 | 0.028 | 1.08 |
| 3 | 0.000 | 0.073 | 0.069 | 0.054 | 0.048 | 0.040 | 0.033 | 0.037 | 0.029 | 0.026 | 0.026 | 2.30 |
| 4 | 0.001 | 0.006 | 0.004 | 0.003 | 0.005 | 0.012 | 0.007 | 0.018 | 0.016 | 0.011 | 0.012 | 0.43 |
| 5 | 0.000 | 0.046 | 0.046 | 0.036 | 0.033 | 0.034 | 0.023 | 0.018 | 0.021 | 0.014 | 0.009 | 1.14 |
| 6 | 0.002 | 0.005 | 0.003 | 0.006 | 0.006 | 0.003 | 0.006 | 0.010 | 0.010 | 0.007 | 0.007 | 0.30 |
| 7 | 0.000 | 0.031 | 0.036 | 0.028 | 0.031 | 0.030 | 0.023 | 0.009 | 0.015 | 0.016 | 0.010 | 0.77 |
| 8 | 0.001 | 0.003 | 0.002 | 0.002 | 0.004 | 0.005 | 0.009 | 0.010 | 0.012 | 0.008 | 0.009 | 0.23 |
| 9 | 0.001 | 0.026 | 0.028 | 0.025 | 0.024 | 0.021 | 0.018 | 0.013 | 0.011 | 0.011 | 0.011 | 0.40 |
| 10 | 0.002 | 0.004 | 0.002 | 0.007 | 0.001 | 0.004 | 0.004 | 0.004 | 0.008 | 0.007 | 0.009 | 0.18 |
| 11 | 0.001 | 0.024 | 0.024 | 0.027 | 0.027 | 0.022 | 0.019 | 0.023 | 0.012 | 0.012 | 0.014 | 0.33 |
| 12 | 0.001 | 0.001 | 0.005 | 0.004 | 0.002 | 0.003 | 0.003 | 0.003 | 0.008 | 0.009 | 0.008 | 0.15 |
| 13 | 0.000 | 0.025 | 0.026 | 0.028 | 0.027 | 0.027 | 0.020 | 0.027 | 0.017 | 0.015 | 0.014 | 0.21 |
| 14 | 0.000 | 0.003 | 0.003 | 0.006 | 0.010 | 0.005 | 0.002 | 0.003 | 0.010 | 0.003 | 0.012 | 0.13 |
| 15 | 0.001 | 0.021 | 0.025 | 0.029 | 0.024 | 0.025 | 0.021 | 0.031 | 0.017 | 0.016 | 0.019 | 0.15 |
| 16 | 0.001 | 0.004 | 0.003 | 0.008 | 0.011 | 0.008 | 0.007 | 0.001 | 0.006 | 0.002 | 0.011 | 0.12 |
| 17 | 0.001 | 0.014 | 0.020 | 0.024 | 0.028 | 0.025 | 0.026 | 0.031 | 0.016 | 0.023 | 0.022 | 0.13 |
| 18 | 0.002 | 0.006 | 0.006 | 0.010 | 0.010 | 0.007 | 0.006 | 0.001 | 0.007 | 0.009 | 0.006 | 0.10 |
| 19 | 0.001 | 0.009 | 0.020 | 0.015 | 0.026 | 0.029 | 0.026 | 0.031 | 0.030 | 0.023 | 0.027 | 0.12 |
| 20 | 0.001 | 0.011 | 0.005 | 0.004 | 0.015 | 0.001 | 0.010 | 0.009 | 0.011 | 0.007 | 0.008 | 0.09 |
| 21 | 0.000 | 0.008 | 0.010 | 0.024 | 0.017 | 0.036 | 0.021 | 0.025 | 0.024 | 0.027 | 0.027 | 0.11 |
| 22 | 0.000 | 0.013 | 0.015 | 0.006 | 0.007 | 0.012 | 0.014 | 0.007 | 0.006 | 0.017 | 0.013 | 0.08 |
| 23 | 0.001 | 0.030 | 0.037 | 0.037 | 0.043 | 0.048 | 0.039 | 0.038 | 0.006 | 0.020 | 0.011 | 0.10 |
| 24 | 0.001 | 0.036 | 0.035 | 0.036 | 0.037 | 0.027 | 0.046 | 0.030 | 0.026 | 0.035 | 0.024 | 0.08 |
| 25 | 0.000 | 0.024 | 0.009 | 0.013 | 0.020 | 0.033 | 0.020 | 0.031 | 0.023 | 0.021 | 0.020 | 0.09 |
| 26 | 0.000 | 0.009 | 0.002 | 0.002 | 0.003 | 0.010 | 0.007 | 0.007 | 0.004 | 0.013 | 0.008 | 0.07 |
| 27 | 0.001 | 0.021 | 0.017 | 0.008 | 0.006 | 0.024 | 0.028 | 0.023 | 0.029 | 0.032 | 0.035 | 0.08 |
| 28 | 0.002 | 0.004 | 0.006 | 0.008 | 0.007 | 0.007 | 0.011 | 0.007 | 0.010 | 0.004 | 0.008 | 0.07 |
| 29 | 0.001 | 0.021 | 0.017 | 0.016 | 0.015 | 0.012 | 0.025 | 0.028 | 0.034 | 0.042 | 0.030 | 0.08 |
| 30 | 0.001 | 0.003 | 0.003 | 0.012 | 0.004 | 0.003 | 0.008 | 0.004 | 0.011 | 0.004 | 0.015 | 0.06 |
| 31 | 0.001 | 0.023 | 0.021 | 0.019 | 0.014 | 0.007 | 0.016 | 0.021 | 0.035 | 0.037 | 0.036 | 0.07 |
| 32 | 0.000 | 0.000 | 0.004 | 0.008 | 0.010 | 0.004 | 0.005 | 0.009 | 0.010 | 0.009 | 0.009 | 0.06 |
| 33 | 0.000 | 0.020 | 0.025 | 0.027 | 0.024 | 0.002 | 0.011 | 0.018 | 0.036 | 0.030 | 0.033 | 0.07 |
| 34 | 0.001 | 0.001 | 0.003 | 0.014 | 0.015 | 0.006 | 0.011 | 0.007 | 0.012 | 0.010 | 0.015 | 0.05 |
| 35 | 0.001 | 0.016 | 0.017 | 0.017 | 0.027 | 0.005 | 0.012 | 0.011 | 0.028 | 0.035 | 0.029 | 0.06 |
| 36 | 0.001 | 0.005 | 0.003 | 0.013 | 0.009 | 0.008 | 0.008 | 0.007 | 0.008 | 0.005 | 0.015 | 0.05 |
| 37 | 0.001 | 0.011 | 0.018 | 0.026 | 0.026 | 0.018 | 0.003 | 0.007 | 0.021 | 0.025 | 0.030 | 0.06 |
| 38 | 0.002 | 0.004 | 0.005 | 0.008 | 0.012 | 0.010 | 0.009 | 0.004 | 0.011 | 0.013 | 0.010 | 0.05 |
| 39 | 0.002 | 0.006 | 0.011 | 0.019 | 0.029 | 0.020 | 0.012 | 0.014 | 0.023 | 0.020 | 0.017 | 0.06 |
| 40 | 0.001 | 0.007 | 0.002 | 0.007 | 0.008 | 0.011 | 0.011 | 0.012 | 0.013 | 0.006 | 0.012 | 0.05 |
| THD | 0.206% | 4.002% | 4.042% | 3.903% | 4.048% | 3.837% | 3.485% | 3.665% | 3.701% | 3.702% | 3.701% | 5% |

Supplementary information: test according to DIN EN 61000-3-2(VDE 0838-2):2019.

Compliance Document

No. D 005028 0357 Rev. 00

E.7 Requirements for the test report for the NS protection

| | | | | | | |
|--|--|----------------|-------------------------------|--|------------------------------------|------------------------------|
| Extract of the test report for NS protection | | | | No.: 64.290.20.30266.01B | | |
| "Determination of electrical properties" | | | | | | |
| Test report NS protection | | | | | | |
| Type of NS protection: | Integrated NS protection | | | Further manufacturer indications | | |
| Software version: | 9200-D | | | -- | | |
| Manufacturer: | Anker Innovations Limited | | | | | |
| Measurement period: | 2020-04-26 to 2021-09-26 | | | | | |
| | Stirling generators, fuel cells | | | Inverter(s) | | |
| | Synchronous and asynchronous generators coupled directly or via inverters with Pn ≤ 50 kW | | | directly coupled synchronous and asynchronous generators with Pn > 50 kW | | |
| Protective function | Setting value | Tripping value | Tripping time NS protection * | Set value | Tripping value | Tripping time NS protection* |
| Rise-in-voltage protection $U >>$ | - | - | - | 1.25 * Un | 288.3V | 169 ms |
| Rise-in-voltage protection $U >$ | - | - | - | 1.10 * Un | 1.00Un – 1.12Un 230V – 257.6V | 520 s |
| | - | - | - | | 1.00Un – 1.08Un 230V – 248.4V | No Disconnection |
| | - | - | - | | 1.06Un – 1.14Un 243.8V – 262.2V | 298 s |
| Voltage drop protection $U <$ | - | - | - | 0.8 * Un | 182.9 V | 3.048 s |
| Voltage drop protection $U <<$ | - | - | - | 0.45 * Un | 102.7V | 303 ms |
| Frequency decrease protection $f <$ | - | - | - | 47.5 Hz | 47.48 Hz | 114 ms |
| Frequency increase protection $f >$ | - | - | - | 51.5 Hz | 51.52 Hz | 135 ms |
| <p>*: The tripping time includes the period from the limit value violation U/f until the tripping signal to the interface switch.</p> <p>When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above.</p> <p>The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms.</p> | | | | | | |
| <input checked="" type="checkbox"/> For integrated NS protection | | | | | | |



Compliance Document

No. D 005028 0357 Rev. 00

| | |
|---|--|
| Assigned to power generation unit of type | Type 2 |
| Type integrated interface switch | Relay |
| Response time of interface switch for integrated NS protection | Manufacture: ANHUI MINGGUANG LIFE ELECTRONIC CO., LTD. Model: BRT2-SS-205DM Rated current: 8 A Operating time: 10ms |
| Verification of the entire functional chain “integrated NS protection – interface switch” has resulted in successful disconnection. | Yes |