



Technical Report No.: 64.290.17.00178.01

Rev. 00

Dated: 2017-05-30

Client: Name: INVT Solar Technology (ShenZhen) Co., Ltd.
Address: No.7 Building Gaofa Industrial Park, Longjing, Nanshan District,
518055 Shenzhen, PEOPLE'S REPUBLIC OF CHINA

Manufacturing place: Manufacturer's Name: INVT Solar Technology (ShenZhen) Co., Ltd.
Address: No.7 Building Gaofa Industrial Park, Longjing, Nanshan District,
518055 Shenzhen, PEOPLE'S REPUBLIC OF CHINA

Test subject: Product: PV grid-interactive inverter
Type: iMars BG4KTR, iMars BG5KTR, iMars BG6KTR, iMars BG4KTR-S,
iMars BG5KTR-S, iMars BG8KTR, iMars BG10KTR

Test specification: IEC 61683:1999
IEC 60068-2-1:2007
IEC 60068-2-2:2007
IEC 60068-2-14:2009
IEC 60068-2-30:2005

Purpose of examination: • Test according to the test specification

Test result: The test results show that the presented product is in compliance with the specified requirements.

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1 Description of the test subject

1.1 Function

- (1) The PGU units are non-isolated (transformerless) PV grid-interactive DC-AC inverters for connection with public low voltage grid, for outdoor or indoor use.
- (2) The unit shall be used at specified ambient range. Temperature: -25 °C ~ +60 °C, Auto-derating after 45 °C; Altitude: < 2000 m; Overvoltage category: II(DC side), III(AC side); Relative humidity range: 4 % ~ 100 %.
- (3) There are two independent MPPT trackers for iMars BG4KTR, iMars BG5KTR, iMars BG6KTR, iMars BG8KTR, iMars BG10KTR. iMars BG4KTR-S and iMars BG5KTR-S have only one MPPT tracker.
- (4) The DC switch is optional, an IP65 barrier cover the hole of enclosure.
- (5) The unit provides two relays in series on each phase (L1, L2, L3). The internal control is redundantly built. It consist one main DSP and slave. Both DSP can open relays independently and communicate with each other.
- (6) The unit can control the active power and reactive power via RS 485 communication port.
- (7) In order to protect the PCE, user and installer, external DC and AC circuit breakers shall be equipped at the end-use application.
- (8) Low voltage electrical installations shall comply with national and local regulation.

1.2 Consideration of the foreseeable misuse

- Not applicable
 Covered through the applied standard
 Covered by the following comment
 Covered by attached risk analysis

1.3 Technical Data

| Model | iMars BG4KTR | iMars BG5KTR | iMars BG6KTR |
|--|-------------------------|-------------------------|-------------------------|
| Vmax PV | 900 Vd.c. | 900 Vd.c. | 900 Vd.c. |
| MPPT voltage range | 200 – 800 Vd.c. | 200 – 800 Vd.c. | 200 – 800 Vd.c. |
| MPPT voltage range (full load) | 210 – 800 Vd.c. | 260 – 800 Vd.c. | 310 – 800 Vd.c. |
| Isc PV | 2x11 Ad.c. | 2x11 Ad.c. | 2x11 Ad.c. |
| Max. continuous PV input current | 2x10 Ad.c. | 2x10 Ad.c. | 2x10 Ad.c. |
| MPPT tracker number Strings/string number per tracker | 2 / 2 | 2 / 2 | 2 / 2 |
| Max. continuous output current | 6.4 Aa.c. | 8 Aa.c. | 9.6 Aa.c. |
| Nominal output voltage | 3/N/PE, 230/400 Va.c. | 3/N/PE, 230/400 Va.c. | 3/N/PE, 230/400 Va.c. |
| Power factor, adjustable | 0.9 leading~0.9 lagging | 0.9 leading~0.9 lagging | 0.9 leading~0.9 lagging |
| Nominal output frequency | 50 Hz | 50 Hz | 50 Hz |



| | | | |
|------------------------------|----------------|----------------|----------------|
| Max. continuous output power | 4000 VA | 5000 VA | 6000 VA |
| Operating temperature range | -25°C to +60°C | -25°C to +60°C | -25°C to +60°C |
| IP class | IP65 | IP65 | IP65 |
| Protective class | I | I | I |

| | | | | |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| Model | iMars BG4KTR-S | iMars BG5KTR-S | iMars BG8KTR | iMars BG10KTR |
| Vmax PV | 900 Vd.c. | 900 Vd.c. | 1000 Vd.c. | 1000 Vd.c. |
| MPPT voltage range | 200 – 800 Vd.c. | 200 – 800 Vd.c. | 200 – 800 Vd.c. | 200 – 800 Vd.c. |
| MPPT voltage range (full load) | 400 – 800 Vd.c. | 450 – 800 Vd.c. | 350 – 800 Vd.c. | 400 – 800 Vd.c. |
| Isc PV | 13 Ad.c. | 13 Ad.c. | 2x13 Ad.c. | 2x14 Ad.c. |
| Max. continuous PV input current | 12 Ad.c. | 12 Ad.c. | 2x12 Ad.c. | 2x12.5 Ad.c. |
| MPPT tracker number / String number per tracker | 1 / 1 | 1 / 1 | 2 / 2 | 2 / 2 |
| Max.continuous output current | 6.4 Aa.c. | 8 Aa.c. | 12.5 Aa.c. | 14 Aa.c. |
| Nominal output voltage | 3/N/PE, 230/400 Va.c. | 3/N/PE, 230/400 Va.c. | 3/N/PE, 230/400 Va.c. | 3/N/PE, 230/400 Va.c. |
| Power factor, adjustable | 0.9 leading~0.9 lagging | 0.9 leading~0.9 lagging | 0.9 leading~0.9 lagging | 0.9 leading~0.9 lagging |
| Nominal output frequency | 50 Hz | 50 Hz | 50 Hz | 50 Hz |
| Max. continuous output power | 4000 VA | 5000 VA | 8800 VA | 9800 VA |
| Operating temperature range | -25°C to +60°C | -25°C to +60°C | -25°C to +60°C | -25°C to +60°C |
| IP class | IP65 | IP65 | IP65 | IP65 |
| Protective class | I | I | I | I |

Copy of marking plate:

See IEC 61683:1999 report No.: 64.290.17.00187.01 page 3

Models difference:

See IEC 61683:1999 report No.: 64.290.17.00187.01 page 7

2 Order

2.1 Date of Purchase Order, Customer's Reference

2016-12-26

2.2 Receipt of Test Sample, Location



2017-2-24
 TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
 5F, Communication Building, 163 Pingyun Rd, Huangpu Ave. West, Guangzhou 510656, P. R. China

2.3 Date of Testing

2017-03-01 to 2017-04-26

2.4 Location of Testing

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
 5F, Communication Building, 163 Pingyun Rd, Huangpu Ave. West, Guangzhou 510656, P. R. China

2.5 Points of Non-compliance or Exceptions of the Test Procedure

N/A

3 Test Results

3.1 Positive Test Results

IEC 60068-2-1:2007, Test Ad: Clause 5.3 + Test Ae: Clause 5.4
 IEC 60068-2-2:2007, Test Bd: Clause 5.3 + Test Be: Clause 5.4
 IEC 60068-2-14:2009, Test Na: Clause 7 + Test Nb: Clause 8
 IEC 60068-2-30:2005, Test Db: Damp heat, cyclic (12 h + 12 h cycle)
 IEC 61683: 1999, See the test report No.: 64.290.17.00178.01

4 Remark to factory

- 4.1 When the product is placed on the market, it must be accompanied with safety instructions written in official language of the country. The instructions shall give information regarding safe operation, installation and maintenance.
- 4.2 The manufacturer/ Importer has to ensure the appliance placing on the market conforms to the applicable local regulation, such as LVD, EMC, RoHS, ErP, and so on.

5 Summary

The test specifications are met.

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
TÜV SÜD Group

Engineer: Max Fang
Max Fang
Project Handler

Technical Report checked: Billy Qiu
Billy Qiu
Designated Reviewer



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IEC 60068-2-1:2007, Tests – Test A: Cold

| | | |
|------|--|---|
| 6.8 | Initial measurements | Functional tests is satisfactory and no visual defects observed before conduct cold test. |
| 5.3 | Test Ad: Cold for heat-dissipating specimens with gradual change of temperature that are powered after initial temperature stabilization | |
| | Temperature | -25 °C as applicant's required. |
| | Duration | 7 h, 1 cycle as applicant's required. |
| | State of specimen | Energizing the specimen. |
| 5.4 | Test Ae: Cold for heat-dissipating specimens with gradual change of temperature that are required to be powered throughout the test | |
| | Temperature | -25 °C as applicant's required. |
| | Duration | 3 h, 1 cycle as applicant's required. |
| | State of specimen during conditioning | Energizing the specimen. |
| 6.10 | Intermediate measurements | Functional tests is satisfactory and no visual defects observed during the cold test. |
| 6.13 | Final measurements | Functional tests is satisfactory and no visual defects observed after the cold test. |
| | The specimen [did not] exhibit broken, cracked, bent, misaligned or torn external surface. | |
| | The specimen [did not] exhibit visible corrosion of output connections. | |
| | The specimen [did not] exhibit cracked or damaged wire or cable. | |
| | The specimen [did not] exhibit exposed live enectrical parts. | |
| | The specimen [did not] exhibit any other conditions which may affect functioning, performance or safety. | |
| | The specimen [did not] exhibit any shorting of live terminals / live parts or cables. | |
| | The specimen [did not] exhibit any sparking of live terminals / live parts or cables. | |
| | The specimen [did not] exhibit any smoking. | |
| | The specimen [did not] stopped functioning. | |

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IEC 60068-2-2:2007, Tests – Test B: Dry heat

| | | |
|------|---|---|
| 6.7 | Initial measurements | Functional tests is satisfactory and no visual defects observed before conduct dry heat test. |
| 5.3 | Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature that are not powered during the conditioning period | |
| | Temperature | +60 °C as applicant's required. |
| | Duration | 7 h, 1 cycle as applicant's required. |
| | State of specimen | Energizing the specimen. |
| 5.4 | Test Be: Dry heat for heat-dissipating specimens with gradual change of temperature that are required to be powered throughout the test | |
| | Temperature | +60 °C as applicant's required. |
| | Duration | 3 h, 1 cycle as applicant's required. |
| | State of specimen during conditioning | Energizing the specimen. |
| 6.9 | Intermediate measurements | Functional tests is satisfactory and no visual defects observed during the dry heat test. |
| 6.13 | Final measurements | Functional tests is satisfactory and no visual defects observed after the dry heat test. |
| | The specimen [did not] exhibit broken, cracked, bent, misaligned or torn external surface. | |
| | The specimen [did not] exhibit visible corrosion of any parts of active circuit visible externally. | |
| | The specimen [did not] exhibit visible corrosion of output connections. | |
| | The specimen [did not] exhibit cracked or damaged wire or cable. | |
| | The specimen [did not] exhibit corrosion of enclosure surface. | |
| | The specimen [did not] exhibit exposed live enectrical parts. | |
| | The specimen [did not] exhibit any other conditions which may affect functioning, performance or safety. | |
| | The specimen [did not] exhibit any shorting of live terminals / live parts or cables. | |
| | The specimen [did not] exhibit any sparking of live terminals / live parts or cables. | |
| | The specimen [did not] exhibit any smoking. | |
| | The specimen [did not] stopped functioning. | |

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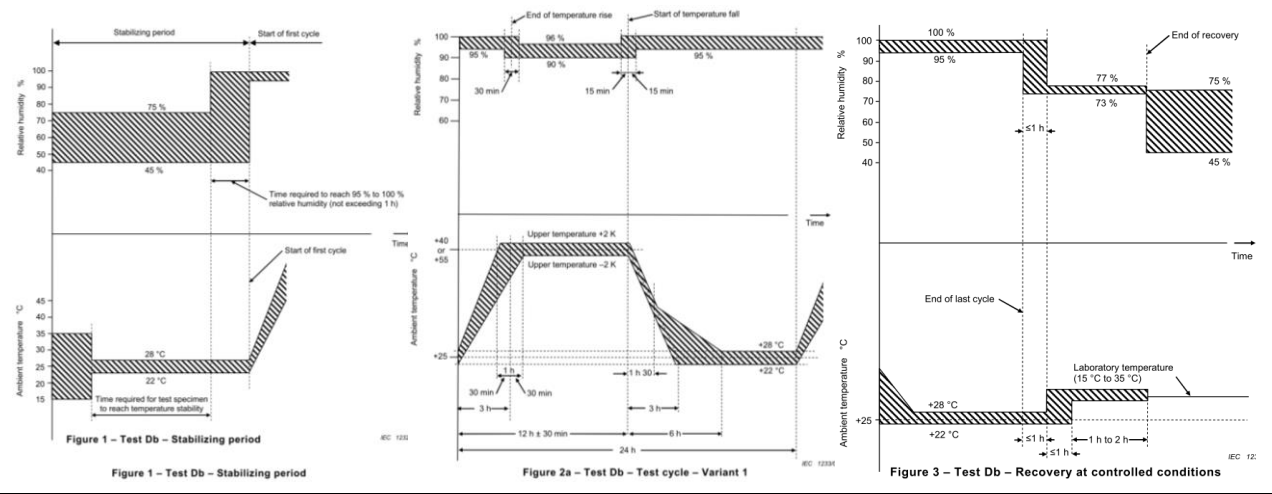
IEC 60068-2-14:2009, Tests – Test N: Change of temperature

| | | |
|-----|--|--|
| 6.1 | Initial measurements | Functional tests is satisfactory. No electrically and mechanically defects observed before conduct change of temperature test. |
| 7 | Test Na: Rapid change of temperature with prescribed time of transfer | |
| | lower temperature, T _A , | -25 °C as applicant's required. |
| | higher temperature, T _B , | +60 °C as applicant's required. |
| | exposure time, t ₁ , | 3 h as applicant's required. |
| | Test cycles | 2 cycles as applicant's required. |
| | Transformer time, t ₂ | t ₂ <3 minutes. Automatic transfer methods used. |
| | Choice of the duration of the transfer time | two-chamber method |
| | State of specimen during conditioning | De-energizing the specimen. |
| 8 | Test Nb: Change of temperature with specified rate of change | |
| | lower temperature, T _A , | -25 °C as applicant's required. |
| | higher temperature, T _B , | +60 °C as applicant's required. |
| | exposure time, t ₁ , | 3 h as applicant's required. |
| | Test cycles | 2 cycles as applicant's required. |
| | Rate of change of temperature | About 3 K/min. |
| | State of specimen during conditioning | De-energizing the specimen. |
| 6.2 | Final measurements | Functional tests is satisfactory. No electrically and mechanically defects observed after conduct change of temperature test. |
| | The specimen [did not] exhibit broken, cracked, bent, misaligned or torn external surface. | |
| | The specimen [did not] exhibit visible corrosion of any parts of active circuit visible externally. | |
| | The specimen [did not] exhibit visible corrosion of output connections and enclosure surface | |
| | The specimen [did not] exhibit cracked or damaged wire or cable or smoking. | |
| | The specimen [did not] exhibit any other conditions which may affect functioning, performance or safety. | |
| | The specimen [did not] exhibit any shorting of live terminals / live parts or cables. | |
| | The specimen [did not] exhibit any sparking of live terminals / live parts or cables. | |
| | The specimen [did not] stopped functioning. | |

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IEC 60068-2-30:2005, Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

| | | |
|-----|-----------------------------|---|
| 6.1 | Initial measurements | Functional tests is satisfactory and no visual defects observed before conduct Damp heat. |
| 5.2 | b) upper temperature: 55 °C | 55 °C |
| | number of cycles: 1, 2, 6. | 1 cycles as applicant's required. |



| | | |
|-----|--|---|
| | State of specimen during conditioning | De-energizing the specimen. |
| 8 | Intermediate measurements | Functional tests is satisfactory and no visual defects observed during conduct Damp heat. |
| 6.2 | Final measurements | Functional tests is satisfactory and no visual defects observed after conduct Damp heat. |
| | The specimen [did not] exhibit broken, cracked, bent, misaligned or torn external surface. | |
| | The specimen [did not] exhibit visible corrosion of any parts of active circuit visible externally. | |
| | The specimen [did not] exhibit visible corrosion of output connections and enclosure surface | |
| | The specimen [did not] exhibit cracked or damaged wire or cable or smoking or sparking. | |
| | The specimen [did not] exhibit any other conditions which may affect functioning, performance or safety. | |
| | The specimen [did not] exhibit any shorting of live terminals / live parts or cables. | |
| | The specimen [did] withstand dielectric strength test. 2121 Vdc / 60 s (PV and Metal enclosure), 4242 Vdc / 60 s (PV and communication port) | |
| | Impulse voltage test The specimen [did] withstand Impulse voltage test. 4464 V _{1,2/50 μs} (PV and Metal enclosure), 6464 V _{1,2/50 μs} (PV and communication port) | |

..... End of Technical Report

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