



**Technical Report No.: 64.290.15.04845.01**

**Rev. 00**

**Dated: 26 October 2015**

**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  
Factory's name: Shenzhen INVT Electric Co., Ltd.  
Address: Zone A, Juyuan Industrial areas, Tang Wei Fuyong street, Baoan  
District, 518103 Shenzhen, PEOPLE'S REPUBLIC OF CHINA

**Test subject:** Product: PV grid-interactive inverter  
Type: iMars BG6KTR, iMars BG8KTR, iMars BG10KTR, iMars BG12KTR,  
iMars BG15KTR, iMars BG17KTR

**Test specification:** 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) There are two independent MPP trackers. Each tracker have four independent strings.
- (3) DC Switch disconnecter is optional and there are two alternative methods of AC output construction: Connector and cable glands.
- (4) 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 BG6KTR	iMars BG8KTR	iMars BG10KTR	iMars BG12KTR	iMars BG15KTR	iMars BG17KTR
V <sub>max</sub> PV	1000 Vd.c.	1000 Vd.c.	1000 Vd.c.	1000 Vd.c.	1000 Vd.c.	1000 Vd.c.
I <sub>sc</sub> PV	12,5 A x 2	15,5 A x 2	21 A x 2	21 A x 2	23,5 A x 2	25,5 A x 2
Maximum operating PV input current	11 A x 2	14 A x 2	19 A x 2	19 A x 2	21 A x 2	23 A x 2
MPPT Range	180 ~ 800 Vd.c.	180 ~ 800 Vd.c.	180 ~ 800 Vd.c.	180 ~ 800 Vd.c.	180 ~ 800 Vd.c.	180 ~ 800 Vd.c.
MPPT Range (full load)	300 ~ 800 Vd.c.	300 ~ 800 Vd.c.	320 ~ 800 Vd.c.	350 ~ 800 Vd.c.	400 ~ 800 Vd.c.	400 ~ 800 Vd.c.
MPPT / Strings per MPPT	2 / 3	2 / 3	2 / 3	2 / 3	2 / 3	2 / 3
Nominal AC voltage	3/N/PE, 230V/400V	3/N/PE, 230V/400V	3/N/PE, 230V/400V	3/N/PE, 230V/400V	3/N/PE, 230V/400V	3/N/PE, 230V/400V
Nominal Frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Max. continuous output current	9,6 A	12,8 A	16,1 A	19,3 A	24,1 A	27,3 A



Nominal active power $P_n$	6 kW	8 kW	10 kW	12 kW	15 kW	17 kW
Power factor (Cos phi), adjustable	0,80 <sub>under-excited</sub> to 0,80 <sub>over-excited</sub>	0,80 <sub>under-excited</sub> to 0,80 <sub>over-excited</sub>	0,80 <sub>under-excited</sub> to 0,80 <sub>over-excited</sub>	0,80 <sub>under-excited</sub> to 0,80 <sub>over-excited</sub>	0,80 <sub>under-excited</sub> to 0,80 <sub>over-excited</sub>	0,80 <sub>under-excited</sub> to 0,80 <sub>over-excited</sub>
Ingress protection	IP65	IP65	IP65	IP65	IP65	IP65
Protective class	I	I	I	I	I	I
Temperature	-25 °C ~ +60 °C	-25 °C ~ +60 °C	-25 °C ~ +60 °C	-25 °C ~ +60 °C	-25 °C ~ +60 °C	-25 °C ~ +60 °C
Overvoltage category	II(DC), III(AC)	II(DC), III(AC)	II(DC), III(AC)	II(DC), III(AC)	II(DC), III(AC)	II(DC), III(AC)

**Copy of marking plate:**

GRID-TIED SOLAR INVERTER		GRID-TIED SOLAR INVERTER		GRID-TIED SOLAR INVERTER	
Model:	iMars BG6KTR	Model:	iMars BG8KTR	Model:	iMars BG10KTR
DC Input		DC Input		DC Input	
Vmax. PV:	1000V	Vmax. PV:	1000V	Vmax. PV:	1000V
MPPT Range:	180V - 800V	MPPT Range:	180V - 800V	MPPT Range:	180V - 800V
Max. Continuous Current:	11AX2	Max. Continuous Current:	14AX2	Max. Continuous Current:	19AX2
Isc PV:	12.5Ax2	Isc PV:	15.5Ax2	Isc PV:	21Ax2
AC Output		AC Output		AC Output	
Max. Continuous Current:	9.6A	Max. Continuous Current:	12.8A	Max. Continuous Current:	16.1A
Max. Continuous Power:	6kVA	Max. Continuous Power:	8kVA	Max. Continuous Power:	10kVA
Frequency:	50Hz	Frequency:	50Hz	Frequency:	50Hz
Nominal Voltage:	3/N/PE, 230V/400V	Nominal Voltage:	3/N/PE, 230V/400V	Nominal Voltage:	3/N/PE, 230V/400V
Power Factor:	+0.8~0.8	Power Factor:	+0.8~0.8	Power Factor:	+0.8~0.8
Temperature:	-25°C...+60°C	Temperature:	-25°C...+60°C	Temperature:	-25°C...+60°C
Protective Class:	I	Protective Class:	I	Protective Class:	I
Overvoltage Category:	II(DC),III(AC)	Overvoltage Category:	II(DC),III(AC)	Overvoltage Category:	II(DC),III(AC)
IP:	IP65	IP:	IP65	IP:	IP65
S/N:		S/N:		S/N:	

 <b>GRID-TIED SOLAR INVERTER</b>		 <b>GRID-TIED SOLAR INVERTER</b>		 <b>GRID-TIED SOLAR INVERTER</b>	
<b>Model:</b>	<b>iMars BG12KTR</b>	<b>Model:</b>	<b>iMars BG15KTR</b>	<b>Model:</b>	<b>iMars BG17KTR</b>
<b>DC Input</b>		<b>DC Input</b>		<b>DC Input</b>	
Vmax. PV:	1000V	Vmax. PV:	1000V	Vmax. PV:	1000V
MPPT Range:	180V - 800V	MPPT Range:	180V - 800V	MPPT Range:	180V - 800V
Max. Continuous Current:	19AX2	Max. Continuous Current:	21AX2	Max. Continuous Current:	23AX2
Isc PV:	21Ax2	Isc PV:	23.5Ax2	Isc PV:	25.5Ax2
<b>AC Output</b>		<b>AC Output</b>		<b>AC Output</b>	
Max. Continuous Current:	19.3A	Max. Continuous Current:	24.1A	Max. Continuous Current:	27.3A
Max. Continuous Power:	12kVA	Max. Continuous Power:	15kVA	Max. Continuous Power:	17kVA
Frequency:	50Hz	Frequency:	50Hz	Frequency:	50Hz
Nominal Voltage:	3/N/PE, 230V/400V	Nominal Voltage:	3/N/PE, 230V/400V	Nominal Voltage:	3/N/PE, 230V/400V
Power Factor:	+0.8~0.8 to 0.8 <sup>over excited</sup>	Power Factor:	+0.8~0.8 to 0.8 <sup>over excited</sup>	Power Factor:	+0.8~0.8
<b>Temperature:</b>	-25°C...+60°C	<b>Temperature:</b>	-25°C...+60°C	<b>Temperature:</b>	-25°C...+60°C
<b>Protective Class:</b>	I	<b>Protective Class:</b>	I	<b>Protective Class:</b>	I
<b>Overvoltage Category:</b>	II(DC),III(AC)	<b>Overvoltage Category:</b>	II(DC),III(AC)	<b>Overvoltage Category:</b>	II(DC),III(AC)
<b>IP:</b>	IP65	<b>IP:</b>	IP65	<b>IP:</b>	IP65
					
S/N: <input type="text"/>		S/N: <input type="text"/>		S/N: <input type="text"/>	

Note: The above artwork nameplate may be only a draft. For the final production, the additional markings or other words which do not conflict with this standard, may be added.

#### Models different:

The six models have same PCB layout, communication port, electric circuits, electronic control circuits, and have similar software settings, with differences as below:

- (1) Have different amounts of bus capacitors.
- (2) Have different software settings for different models.

## 2 Order

### 2.1 Date of Purchase Order, Customer's Reference

14 October 2015

### 2.2 Receipt of Test Sample, Location

15 October 2015

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

15 October 2015 – 24 October 2015

### 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)

### 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:

**Richard Li**  
Project Handler

Technical Report checked:

**Billy Qiu**  
Designated Reviewer



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	8 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	7 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.	



**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	5 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	4 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**

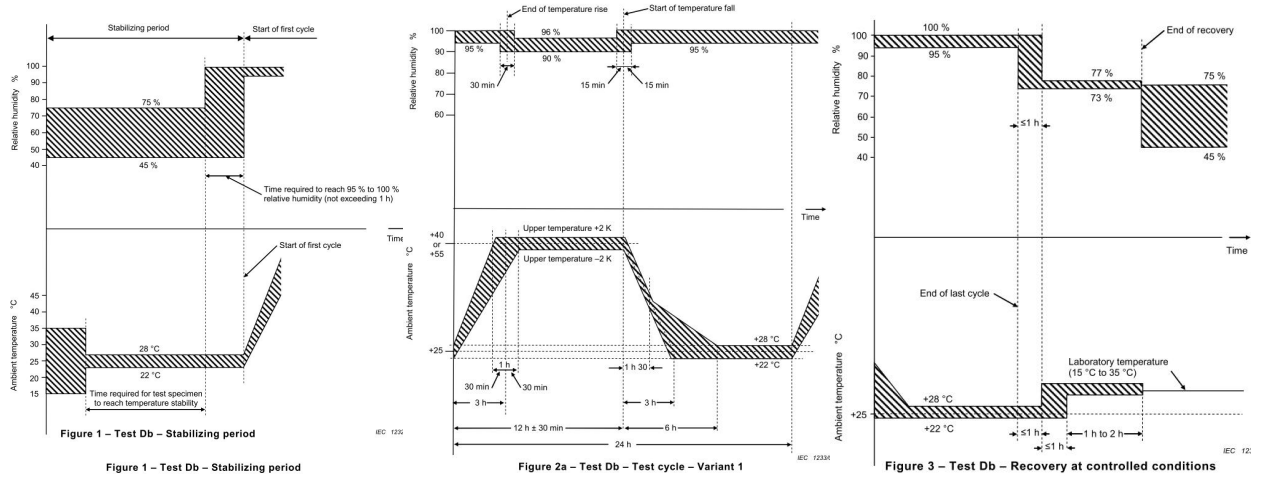
6.1	Initial measurements	Functional tests is satisfactory. No electrically and mechanically defects observed before conduct change of temperature test.
7	Test Na: Rapid change of temperature with prescribed time of transfer	
	lower temperature, $T_A$ ,	-25 °C as applicant's required.
	higher temperature, $T_B$ ,	+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, $t_2$	$t_2 < 1,5$ 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	1 cycles as applicant's required.
	Rate of change of temperature	About 0,8 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 <sub>1,2/50 μs</sub> (PV and Metal enclosure), 6464 V <sub>1,2/50 μs</sub> (PV and communication port)	

..... End of Technical Report .....

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