Declaration Of Compliance

We, The Manufacturer
SHENZHEN GROWATT NEW ENERGY CO.,LTD

Declare The Products:
MIC 1000TL-X, MIC 1500TL-X, MIC 2000TL-X, MIC 2500TL-X, MIC3000TL-X,
MIN 2500TL-X, MIN 3000TL-X, MIN 4200TL-X, MIN 5000TL-X, MIN 6000TL-X
MAX50KTL3 LV, MAX60KTL3 LV, MAX70KTL3 LV, MAX75KTL3 LV, MAX80KTL3 LV
MAX80KTL3 MV,MAX90KTL3 MV,MAX100KTL3 MV
MID15KTL3-X,MID17KTL3-X,MID20KTL3-X,MID22KTL3-X,MID25KTL3-X;
MID25KTL3-X1,MID30KTL3-X,MID33KTL3-X, MID36KTL3-X,MID40KTL3-X
MAC50KTL3-X LV/MAC50KTL3-X MV,MAC60KTL3-X LV/MAC60KTL3-X MV
MAC70KTL3-X MV
MAX 185KTL3-X HV,MAX 216KTL3-X HV, MAX 250KTL3-X HV,MAX 253KTL3-X HV,
MOD 10KTL3-X, MOD 11KTL3-X, MOD 12KTL3-X, MOD 13KTL3-X, MOD 15KTL3-X
MIN 7000TL-X（E）,MIN 8000TL-X（E）,MIN 9000TL-X ,MIN 10000TL-X
MAX100KTL3-X LV, MAX110KTL3-X LV ,MAX120KTL3-X LV ,MAX125KTL3-X LV
MAC 15KTL3-XL, MAC 20KTL3-XL, MAC 22KTL3-XL MAC 25KTL3-XL, MAC 30KTL3-XL, MAC 36KTL3-XL
MID 10K TL3-XL, MID 12K TL3-XL, MID 15K TL3-XL, MID 20K TL3-XL
MAX 50 KTL3-XL2, MAX 60 KTL3-XL2, MAX 70 KTL3-XL2, MAX 75KTL3-XL2,
The Growatt inverters listed above comply with the relevant requirements of the Brazilian standard:
ABNT NBR 16149:2013 Sistemas fotovoltaicos (FV) – Características da interface de conexão com a rede elétrica de distribuição – Primeira edição (01.03.2013)
[Photovoltaic (PV) systems – Characteristics of the utility interface – first edition, March 01-2013]
As results after internal testing made in accordance to the applicable conformance test protocol:
ABNT NBR 16150:2013 Sistemas fotovoltaicos (FV) — Características da interface de conexão com a rede elétrica de distribuição — Procedimento de ensaio de conformida - Primeira edição (04.03.2013)
[Photovoltaic (PV) systems – Characteristics of the utility interface – Conformity test procedure. First edition, March 04-2013]
ABNT NBR 62116-2012 Procedimento de ensaio de anti-ilhamento para inversores de sistemas fotovoltaico conectados à rede.

Please refer to the conditions and restriction of use specified in the table, as well as in the following notes.

GROWATT

Inverter Model	Power	Nominal voltage/frequency No. of phase	Cos(phi)=f(p)	Reactive Power Capability	FRT capability
MIC 1000TL-X	1kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIC 1500TL-X	1.5kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIC 2000TL-X	2kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIC 2500TL-X	2.5kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIC 3000TL-X	3kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 2500TL-X	2.5kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 3000TL-X	3kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 4200TL-X	4.2kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 5000TL-X	5kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 6000TL-X	6kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 7000TL-X(E)	7kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 8000TL-X(E)	8kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 9000TL-X	9kw	220V/60Hz,1-phase	Yes	Yes	Yes
MIN 10000TL-X	10kw	220V/60Hz,1-phase	Yes	Yes	Yes
MID 10K TL3-XL	10kw	220V/60Hz,3-phase	Yes	Yes	Yes
MID 12K TL3-XL	12kw	220V/60Hz,3-phase	Yes	Yes	Yes
MID 15K TL3-XL	15kw	220V/60Hz,3-phase	Yes	Yes	Yes
MID 20K TL3-XL	20kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAC 15KTL3-XL	15kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAC 20KTL3-XL	20kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAC 22KTL3-XL	22kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAC 25KTL3-XL	25kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAC 30KTL3-XL	30kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAC 36KTL3-XL	36kw	220V/60Hz,3-phase	Yes	Yes	Yes
MAX 50 KTL3-XL2	50kW	220V/60Hz,3-phase	Yes	Yes	Yes
MAX 60 KTL3-XL2	60kW	220V/60Hz,3-phase	Yes	Yes	Yes
MAX 70 KTL3-XL2	70kW	220V/60Hz,3-phase	Yes	Yes	Yes
MAX 75 KTL3-XL2	75kW	220V/60Hz,3-phase	Yes	Yes	Yes
MOD 10KTL3-X	10kw	380V/60Hz,3-phase	Yes	Yes	Yes
MOD 11KTL3-X	11kw	380V/60Hz,3-phase	Yes	Yes	Yes
MOD 12KTL3-X	12kw	380V/60Hz,3-phase	Yes	Yes	Yes
MOD 13KTL3-X	13kw	380V/60Hz,3-phase	Yes	Yes	Yes
MOD 15KTL3-X	15kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID17KTL3-X	17kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID20KTL3-X	20kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID22KTL3-X	22kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID25KTL3-X	25kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID25KTL3-X1	25kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID30KTL3-X	30kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID33KTL3-X	33kw	380V/60Hz,3-phase	Yes	Yes	Yes

深圳古瑞瓦特新能源有限公司
Shenzhen Growatt New Energy Co.,Ltd

Add 深圳市宝安区西乡街道固兴社区航城大道中德欧产业示范园A栋A401,4--13楼 4-13/F,Building A,Sino-German(Europe)Industrial Park, Hangcheng Ave,Bao'an District,Shenzhen, China
Tel 0755 2951 5888 Web www.ginverter.com
Fax 0755 2747 2131 Email info@ginverter.com

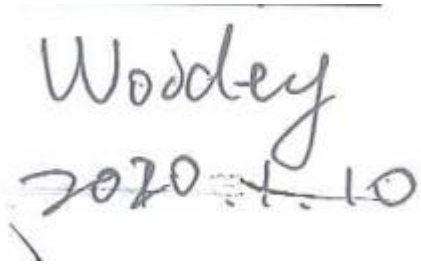
MID36KTL3-X	36kw	380V/60Hz,3-phase	Yes	Yes	Yes
MID40KTL3-X	40kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAC50KTL3-X LV	50kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAC60KTL3-X LV	60kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX50KTL3 LV	50kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX60KTL3 LV	60kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX70KTL3 LV	70kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX75KTL3 LV	75kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX80KTL3 LV	80kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX100KTL3-X LV	100kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX110KTL3-X LV	110kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX120KTL3-X LV	120kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAX125KTL3-X LV	125kw	380V/60Hz,3-phase	Yes	Yes	Yes
MAC50KTL3-X MV	50kw	480V/60Hz,3-phase	Yes	Yes	Yes
MAC60KTL3-X MV	60kw	480V/60Hz,3-phase	Yes	Yes	Yes
MAC70KTL3-X MV	70kw	480V/60Hz,3-phase	Yes	Yes	Yes
MAX80KTL3 MV	80kw	480V/60Hz,3-phase	Yes	Yes	Yes
MAX90KTL3 MV	90kw	480V/60Hz,3-phase	Yes	Yes	Yes
MAX100KTL3 MV	100kw	480V/60Hz,3-phase	Yes	Yes	Yes
MAX 185KTL3-X HV	185kw	800V/60Hz,3-phase	Yes	Yes	Yes
MAX 216KTL3-X HV	216kw	800V/60Hz,3-phase	Yes	Yes	Yes
MAX 250KTL3-X HV	250kw	800V/60Hz,3-phase	Yes	Yes	Yes
MAX 253KTL3-X HV	253kw	800V/60Hz,3-phase	Yes	Yes	Yes

Manufacturer：

Shenzhen Growatt New Energy CO., LTD

R&D Director

Mr.Woody Wu



深圳古瑞瓦特新能源有限公司
Shenzhen Growatt New Energy Co.,Ltd

Add 深圳市宝安区西乡街道固兴社区航城大道中德欧产业示范园A栋A401,4--13楼 4-13/F,Building A,Sino-German(Europe)Industrial Park, Hangcheng Ave,Bao'an District,Shenzhen, China
Tel 0755 2951 5888 Web www.ginverter.com
Fax 0755 2747 2131 Email info@ginverter.com

Declaração de Conformidade

Fabricante: SHENZHEN GROWATT NEW ENERGY CO., LTD

Produto：Inversores On Grid

Modelo：MID 10-20KTL3-XL

Para que o equipamento opere na melhor eficiência de conversão, recomendamos：

1. **A string fotovoltaica** não deve exceder **600V CC.**
2. A corrente de entrada em uma MPPT não deve ser maior que **26A.**

Modelo：MAC 22-36KTL3-XL

Para que o equipamento opere na melhor eficiência de conversão, recomendamos：

1. **A string fotovoltaica** não deve exceder **600V CC.**
2. A corrente de entrada em uma MPPT não deve ser maior que **46A.**

Modelo：MAX 50-75KTL3-XL2

Para que o equipamento opere na melhor eficiência de conversão, recomendamos：

1. **A string fotovoltaica** não deve exceder **600V CC.**
2. A corrente de entrada em uma MPPT não deve ser maior que **45A.**

2022/09/26

SHENZHEN GROWATT NEW ENERGY CO., LTD

Growatt New Energy
4-13/F,Building A,Sino-German(Europe),
Industrial Park Hangcheng Ave,
Baoan District,Shenzhen,P.R.China

T + 86 755 2974 3121
F + 86 755 2749 1460
P.C. 518000

E info@ginverter.com
W www.growatt.com
W www.ginverter.com

Certificate of Conformity

Certificate Number: CN-PV-220113

On the basis of the tests undertaken, the samples of the below product have been found to comply with the requirements of the referenced specifications /standards at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture. The manufacturer shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant:	Shenzhen Growatt New Energy Co., Ltd. 4-13/F, Building A, Sino-German (Europe) Industrial Park, Hangcheng Ave, Bao'an District, Shenzhen, China
Product:	PV Grid inverter
Ratings & Principle Characteristics:	See Appendix to Certificate of Conformity
Model:	MAX 50KTL3-XL2, MAX 60KTL3-XL2, MAX 70KTL3-XL2, MAX 73KTL3-XL2 MAX 75KTL3-XL2, MAX 50KTL3-XL1, MAX 60KTL3-XL1, MAX 70KTL3-XL1, MAX 73KTL3-XL1, MAX 75KTL3-XL1
Brand Name<s>:	GROWATT
Product Complies with:	IEC 61727:2004. Photovoltaic (PV) systems – Characteristics of the utility interface IEC 62116:2014. Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai West Area, 2nd Floor, No. 707, Zhangyang Road China (Shanghai) Pilot Free Trade Zone, Shanghai, P. R. China Accredited by China National Accreditation Service for Conformity Assessment (CNAS C058-P) in accordance with ISO/IEC 17065:2012
Test Report No.<s>:	220308046GZU-001, 220308046GZU-002

Certification procedure: SMS-PV-OP-19
Product certification scheme type: Type test
Additional information in Appendix.

Signature

Certification Manager: Grady Ye
Date: 1 June 2022

中国认可
国际互认
产品
PRODUCT
CNAS C058-P

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-220113

Model	MAX 50KTL3-XL2	MAX 60KTL3-XL2	MAX 70KTL3-XL2	MAX 73KTL3-XL2	MAX 75KTL3-XL2
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	8*45A				
PV Isc	8*56.5A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-220113

Model	MAX 50KTL3-XL1	MAX 60KTL3-XL1	MAX 70KTL3-XL1	MAX 73KTL3-XL1	MAX 75KTL3-XL1
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	10*32A				
PV Isc	10*40A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

TL-395

Test Report issued under the responsibility of:

Total Quality. Assured.

TEST REPORT
IEC 61727
Photovoltaic (PV) systems – Characteristics of the utility interface

Report Number. ..... :	220308046GZU-001
Date of issue ..... :	30 May 2022
Total number of pages ..... :	26 Pages
Name of Testing Laboratory preparing the Report ..... :	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Applicant's name ..... :	Shenzhen Growatt New Energy Co., Ltd.
Address ..... :	4-13/F, Building A, Sino-German (Europe) Industrial Park, Hangcheng Ave, Bao'an District, Shenzhen, China
Test specification:	
Standard ..... :	IEC 61727:2004
Test procedure ..... :	Type approval
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC61727B
Test Report Form(s) Originator .... :	TÜV SÜD Product Service GmbH
Master TRF ..... :	Dated 2017-11-03

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

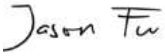
General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description . :	PV Grid inverter
Trade Mark ..... :	GROWATT
Manufacturer..... :	Same as applicant
Model/Type reference :	MAX 50KTL3-XL2, MAX 60KTL3-XL2, MAX 70KTL3-XL2, MAX 73KTL3-XL2 MAX 75KTL3-XL2, MAX 50KTL3-XL1, MAX 60KTL3-XL1, MAX 70KTL3-XL1, MAX 73KTL3-XL1, MAX 75KTL3-XL1
Ratings ..... :	

Model	MAX 50KTL3-XL2	MAX 60KTL3-XL2	MAX 70KTL3-XL2	MAX 73KTL3-XL2	MAX 75KTL3-XL2
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	8*45A				
PV Isc	8*56.5A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				
Model	MAX 50KTL3-XL1	MAX 60KTL3-XL1	MAX 70KTL3-XL1	MAX 73KTL3-XL1	MAX 75KTL3-XL1

	Max.PV voltage	1100Vdc				
	MPPT voltage	180-850Vdc				
	Max.input current	10*32A				
	PV Isc	10*40A				
	Nominal output voltage	3W/N/PE, 127/220Vac				
	Nominal output Frequency	50/60Hz				
	Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
	Max. output power	50KW	60KW	70KW	73KW	75KW
	Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
	Power factor range	0.8Leading~0.8Lagging				
	Safety level	Class I				
	Ingress Protection	IP 66				
	Operation Ambient Temperature	-30℃ - +60℃				
	Software version	TN1.0				

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
Testing location/ address.....:		Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China	
☐	**Associated CB Testing Laboratory:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name, function, signature).....:		Joss Huang Engineer	
Approved by (name, function, signature)...:		Jason Fu Supervisor	
☐	**Testing procedure: TMP/CTF Stage 1:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name, function, signature).....:		N/A	
Approved by (name, function, signature)...:		N/A	
☐	**Testing procedure: WMT/CTF Stage 2:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name + signature) .....:		N/A	
Witnessed by (name, function, signature) .:		N/A	
Approved by (name, function, signature)...:		N/A	
☐	**Testing procedure: SMT/CTF Stage 3 or 4:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name, function, signature).....:		N/A	
Witnessed by (name, function, signature) .:		N/A	
Approved by (name, function, signature)...:		N/A	
Supervised by (name, function, signature) :		N/A	

List of Attachments (including a total number of pages in each attachment):

Appendix 1: photos (3 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All applicable tests	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

Summary of compliance with National Differences:

List of countries addressed

N/A

☒ **The product fulfils the requirements of IEC 61727:2004**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL1
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	32 d.c.A*10
Max. input current	40 d.c.A*10
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China

GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL2
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	56.5 d.c.A*8
Max. input current	45 d.c.A*8
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China

Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation.
3. Other labels are identical to above, except the model's name and ratings

Test item particulars.....:	
Classification of installation and use.....:	Fixed and outdoor use
Supply Connection.....:	Permanent connection
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	06 April 2022
Date (s) of performance of tests.....:	06 April 2022 to 10 May 2022

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

This report shall be used together with the report 220308046GZU-002.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) ..... :	Guangdong Growatt New Energy Co., Ltd. Growatt Industrial Park,No.17 Pingheng Road Pingtan Town,Huiyang District,Huizhou,Guangdong, China

General product information:

The unit is a three-phase PV Grid inverter, it can convert the high PV voltage to Grid voltage and feed into Grid network.

The unit is providing EMC filtering at the PV side and AC side. It is transformerless between the PV circuit and AC circuit.

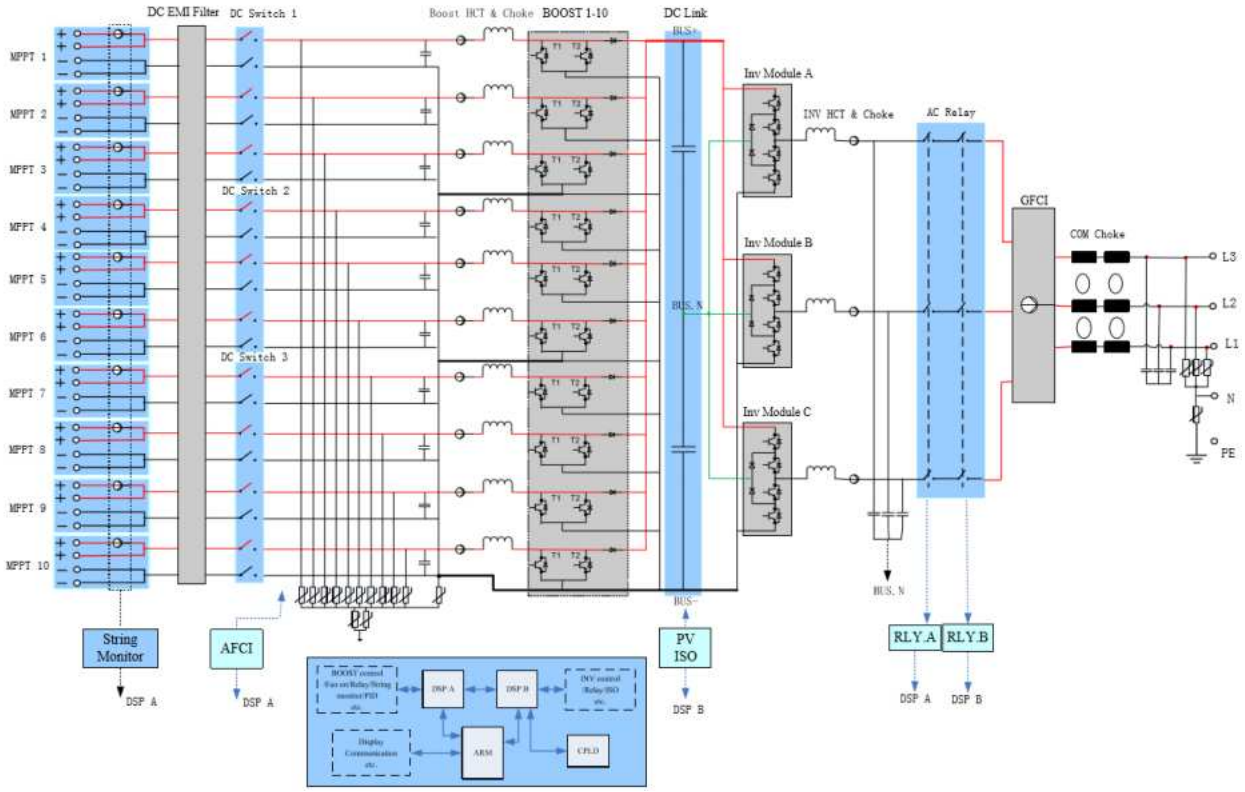
The unit has three controllers. The master controller DSP A measure the PV voltage and current, AFCI, PV ISO and also communicate with the slave controller B and slave controller ARM and etc; The slave controller DSP B is used to INV control and PV ISO measurement and etc.

The slave controller ARM monitor AC voltage, GFCI and communicate with the master controller DSP

The relays are designed to redundant structure that controlled by separately.

The master controller A and slave controller B are used together to control relay open or close, if the single fault on one controller, the other controller can be capable to open the relay, so that still providing safety means.

The topology diagram as following:



Difference of models:

All models are identical, except the number of MPPT and the output power derating in software.

Other than special notice, the model MAX 75KTL3-XL2 is as the representative test model in this report.

IEC61727			
Cl.	Requirement - Test	Result	Verdict

4	**UTILITY COMPATIBILITY**		**P**
	The quality of power provided by the PV system for the on-site AC loads and for power delivered to the utility is governed by practices and standards on voltage, flicker, frequency, harmonics and power factor.		P
	Deviation from these standards represents out-of-bounds conditions and may require the PV system to sense the deviation and properly disconnect from the utility system.		P
4.1	**Voltage, current and frequency**		**P**
	The PV system AC voltage, current and frequency are compatible with the utility system.		P
4.2	**Normal voltage operating range**		**P**
	Utility-interconnected PV systems do not normally regulate voltage, they inject current into the utility. Therefore, the voltage operating range for PV inverters is selected as a protection function that responds to abnormal utility conditions, not as a voltage regulation function.		P
4.3	**Flicker**		**P**
	The operation of the PV system is not cause voltage flicker in excess of limits stated in the relevant sections of IEC 61000-3-3 for systems less than 16 A or IEC 61000-3-5 for systems with current of 16 A and above.		P
4.4	**DC injection**		**P**
	The PV system is not inject DC current greater than 1 % of the rated inverter output current, into the utility AC interface under any operating condition.	(See appended table)	P
4.5	**Normal frequency operating range**		**P**
	The PV system operates in synchronism with the utility system, and within the frequency trip limits defined in 5.2.2.		P
4.6	**Harmonics and waveform distortion**		**P**
	Total harmonic current distortion is less than 5 % at rated inverter output. Each individual harmonic is limited to the percentages listed in Table 1.	(See appended table)	P
	Even harmonics in these ranges is less than 25 % of the lower odd harmonic limits listed.		P

IEC61727			
Cl.	Requirement - Test	Result	Verdict
	Table 1 – Current distortion limits **Odd harmonics** / **Distortion limit** 3rd through 9th — Less than 4,0 % 11th through 15th — Less than 2,0 % 17th through 21st — Less than 1,5 % 23rd through 33rd — Less than 0,6 % **Even harmonics** / **Distortion limit** 2nd through 8th — Less than 1,0 % 10th through 32nd — Less than 0,5 %		P
4.7	The PV system has a lagging power factor greater than 0,9 when the output is greater than 50 % of the rated inverter output power.		P
5	**PERSONNEL SAFETY AND EQUIPMENT PROTECTION**		**P**
	This Clause provides information and considerations for the safe and proper operation of the utility-connected PV systems.		P
5.1	**Loss of utility voltage**		**P**
	To prevent islanding, a utility connected PV system ceases to energize the utility system from a de-energized distribution line irrespective of connected loads or other generators within specified time limits.	Complied with IEC 62116, See the separate report for reference	P
	A utility distribution line can become de-energized for several reasons. For example, a substation breaker opening due to fault conditions or the distribution line switched out during maintenance.		P
5.2	**Over/under voltage and frequency**		**P**
	The abnormal utility conditions of concern are voltage and frequency excursions above or below the values stated in this Clause, and the complete disconnection of the utility, presenting the potential for a distributed resource island.		P
5.2.1	**Over/under voltage**		**P**
	When the interface voltage deviates outside the conditions specified in Table 2, the photovoltaic system ceases to energize the utility distribution system. This applies to any phase of a multiphase system.	(See appended table)	P

IEC61727			
Cl.	Requirement - Test	Result	Verdict

	Table 2 – Response to abnormal voltages Voltage (at point of utility connection) / Maximum trip time* V < 0,5 × Vnominal / 0,1 s 50 % ≤ V < 85 % / 2,0 s 85 % ≤ V ≤ 110 % / Continuous operation 110 % < V < 135 % / 2,0 s 135 % ≤ V / 0,05 s * Trip time refers to the time between the abnormal condition occurring and the inverter ceasing to energize the utility line. The PV system control circuits shall actually remain connected to the utility to allow sensing of utility electrical conditions for use by the "reconnect" feature.		P
5.2.2	**Over/under frequency**		**P**
	When the utility frequency deviates outside the specified conditions the photovoltaic system ceases to energize the utility line. The unit does not have to cease to energize if the frequency returns to the normal utility continuous operation condition within the specified trip time.	(See appended table)	P
	When the utility frequency is outside the range of ±1 Hz, the system ceases to energize the utility line within 0,2 s. The purpose of the allowed range and time delay is to allow continued operation for short-term disturbances and to avoid excessive nuisance tripping in weak-utility system conditions.		P
5.3	**Islanding protection**		**P**
	The PV system must cease to energize the utility line within 2 s of loss of utility.		P
5.4	**Response to utility recovery**		**P**
	Following an out-of-range utility condition that has caused the photovoltaic system to cease energizing, the photovoltaic system is not energize the utility line for 20 s to 5 min after the utility service voltage and frequency have recovered to within the specified ranges.	(See appended table)	P
5.5	**Earthing**		**P**
	The utility interface equipment is earthed/grounded in accordance with IEC 60364-7-712.		P
5.6	**Short circuit protection**		**N/A**
	The photovoltaic system has short-circuit protection in accordance with IEC 60364-7-712.	Should consider in the end use	N/A
5.7	**Isolation and switching**		N/A
	A method of isolation and switching is provided in accordance with IEC 60364-7-712.	Should consider in the end use	N/A

IEC61727			
Cl.	Requirement - Test	Result	Verdict

4.3	TABLE: Flicker			P
Model: MAX 75KTL3-XL2				
	Starting	**Stopping**	**Running**	
Limit	**4%**	**4%**	**Pst = 1.0**	**Plt = 0.65**
Test value L1-N	1.61	2.99	0.58	0.54
Test value L2-N	0.73	2.86	0.59	0.55
Test value L3-N	1.56	2.97	0.59	0.55
Supplementary information:				

4.4	TABLE: Direct current injection								P
Rated output current (A)	**Ratio of rated output power (VA)**	**Measured DC output current between terminals**						**Isolated transformer ? (Yes/No)**	**Limit (mA)**
		L1-L2 (mA)	**L1-L3 (mA)**	**L2-L3 (mA)**	**L1-N (mA)**	**L2-N (mA)**	**L3-N (mA)**		
Model: MAX 75KTL3-XL2									
196.9	25%	--	--	--	215.7	109.0	120.0	No	1969
196.9	50%	--	--	--	152.4	129.9	109.7	No	1969
196.9	100%	--	--	--	582.2	565.3	517.7	No	1969
Model: MAX 50KTL3-XL2									
131.2	25%	--	--	--	486.6	543.9	607.8	No	1312
131.2	50%	--	--	--	497.2	458.9	442.7	No	1312
131.2	100%	--	--	--	535.9	523.3	473.4	No	1312
Supplementary information:									

4.6	TABLE: Harmonics and waveform distortion						P
Model: MAX 75KTL3-XL2							
Harmonic	**fundamental L1 (A)**	**% of fundamental)**	**fundamental L2 (A)**	**% of fundamental)**	**fundamental L3 (A)**	**% of fundamental)**	**Harmonic Current Limits (%)**
02	0.2266	0.1150	0.3814	0.1950	0.1367	0.0700	1.0%
03	0.1721	0.0870	0.2336	0.1190	0.0611	0.0310	4.0%

IEC61727							
Cl.	Requirement - Test				Result		Verdict
04	0.0808	0.0410	0.2005	0.1020	0.1947	0.0990	1.0%
05	3.2068	1.6260	3.3086	1.6870	3.1664	1.6140	4.0%
06	0.0604	0.0310	0.1152	0.0590	0.0354	0.0180	1.0%
07	1.4608	0.7410	1.5422	0.7870	1.3969	0.7120	4.0%
08	0.1153	0.0580	0.1279	0.0650	0.0400	0.0200	1.0%
09	0.0739	0.0370	0.0337	0.0170	0.0909	0.0460	4.0%
10	0.1132	0.0570	0.1368	0.0700	0.1026	0.0520	0.5%
11	0.9060	0.4590	0.8268	0.4220	0.7467	0.3810	2.0%
12	0.0852	0.0430	0.0994	0.0510	0.0952	0.0490	0.5%
13	0.8945	0.4530	0.9354	0.4770	0.9098	0.4640	2.0%
14	0.0512	0.0260	0.0207	0.0110	0.0606	0.0310	0.5%
15	0.0663	0.0340	0.1000	0.0510	0.0634	0.0320	2.0%
16	0.1032	0.0520	0.0936	0.0480	0.1050	0.0540	0.5%
17	0.7812	0.3960	0.7098	0.3620	0.6849	0.3490	1.5%
18	0.0544	0.0280	0.0094	0.0050	0.0707	0.0360	0.5%
19	0.2055	0.1040	0.2316	0.1180	0.2439	0.1240	1.5%
20	0.0586	0.0300	0.0806	0.0410	0.0215	0.0110	0.5%
21	0.0418	0.0210	0.0337	0.0170	0.0346	0.0180	1.5%
22	0.0145	0.0070	0.0337	0.0170	0.0080	0.0040	0.5%
23	0.3791	0.1920	0.3900	0.1990	0.3871	0.1970	0.6%
24	0.0016	0.0010	0.0067	0.0030	0.0073	0.0040	0.5%
25	0.0967	0.0490	0.0858	0.0440	0.0925	0.0470	0.6%
26	0.0475	0.0240	0.0413	0.0210	0.0308	0.0160	0.5%
27	0.0184	0.0090	0.0134	0.0070	0.0085	0.0040	0.6%
28	0.0467	0.0240	0.0219	0.0110	0.0285	0.0150	0.5%
29	0.0642	0.0330	0.0830	0.0420	0.0721	0.0370	0.6%
30	0.0283	0.0140	0.0387	0.0200	0.0091	0.0050	0.5%
31	0.1072	0.0540	0.0982	0.0500	0.1058	0.0540	0.6%
32	0.0075	0.0040	0.0290	0.0150	0.0159	0.0080	0.5%
33	0.0407	0.0210	0.0262	0.0130	0.0203	0.0100	0.6%
THD	1.967		2.039		1.922		5%
Supplementary information:							

IEC61727			
Cl.	Requirement - Test	Result	Verdict

4.6	TABLE: Harmonics and waveform distortion						P
Model: MAX 50KTL3-XL2							
Harmonic	**fundamental L1 (A)**	**% of fundamental)**	**fundamental L2 (A)**	**% of fundamental)**	**fundamental L3 (A)**	**% of fundamental)**	**Harmonic Current Limits (%)**
02	0.1085	0.0820	0.2345	0.1790	0.1366	0.1040	1.0%
03	0.0724	0.0550	0.1052	0.0800	0.0461	0.0350	4.0%
04	0.0952	0.0720	0.1341	0.1020	0.1260	0.0960	1.0%
05	1.4840	1.1230	1.5372	1.1700	1.4581	1.1090	4.0%
06	0.0435	0.0330	0.0754	0.0570	0.0588	0.0450	1.0%
07	0.8371	0.6330	0.9378	0.7140	0.8570	0.6520	4.0%
08	0.0433	0.0330	0.0692	0.0530	0.0332	0.0250	1.0%
09	0.0361	0.0270	0.0271	0.0210	0.0675	0.0510	4.0%
10	0.0115	0.0090	0.0566	0.0430	0.0654	0.0500	0.5%
11	0.5575	0.4220	0.5276	0.4020	0.4949	0.3770	2.0%
12	0.0673	0.0510	0.0855	0.0650	0.0683	0.0520	0.5%
13	0.4533	0.3430	0.4605	0.3510	0.4722	0.3590	2.0%
14	0.0546	0.0410	0.0302	0.0230	0.0387	0.0290	0.5%
15	0.0280	0.0210	0.0137	0.0100	0.0343	0.0260	2.0%
16	0.0411	0.0310	0.0446	0.0340	0.0077	0.0060	0.5%
17	0.6799	0.5140	0.6253	0.4760	0.6337	0.4820	1.5%
18	0.0280	0.0210	0.0309	0.0240	0.0342	0.0260	0.5%
19	0.1276	0.0970	0.1231	0.0940	0.1045	0.0800	1.5%
20	0.0406	0.0310	0.0573	0.0440	0.0133	0.0100	0.5%
21	0.0252	0.0190	0.0189	0.0140	0.0069	0.0050	1.5%
22	0.0167	0.0130	0.0219	0.0170	0.0280	0.0210	0.5%
23	0.2891	0.2190	0.2797	0.2130	0.2477	0.1880	0.6%
24	0.0251	0.0190	0.0264	0.0200	0.0378	0.0290	0.5%
25	0.0961	0.0730	0.1082	0.0820	0.0522	0.0400	0.6%
26	0.0131	0.0100	0.0431	0.0330	0.0266	0.0200	0.5%
27	0.0304	0.0230	0.0084	0.0060	0.0198	0.0150	0.6%
28	0.0420	0.0320	0.0503	0.0380	0.0717	0.0550	0.5%
29	0.0451	0.0340	0.0461	0.0350	0.0670	0.0510	0.6%

IEC61727			
Cl.	Requirement - Test	Result	Verdict

30	0.0197	0.0150	0.0246	0.0190	0.0189	0.0140	0.5%
31	0.0624	0.0470	0.1120	0.0850	0.0753	0.0570	0.6%
32	0.0039	0.0030	0.0193	0.0150	0.0355	0.0270	0.5%
33	0.0189	0.0140	0.0162	0.0120	0.0378	0.0290	0.6%
THD	1.530		1.596		1.507		5%
Supplementary information:							

4.7	TABLE: Power factor							P
Model: MAX 75KTL3-XL2								
	Input			Output				
No	Voltage (V d.c.)	Current (A d.c.)	Power (W)	Voltage (V a.c.)	Current (A a.c.)	Power (W)	Power factor (+/-)	Rated output (V.A)
1	362.38	44.59	16155.43	126.32	40.16	15163.87	0.9963	(20±5)%
2	362.15	66.08	23929.70	126.51	60.00	22707.25	0.9972	(30±5)%
3	361.78	87.82	31769.51	126.70	79.81	30263.72	0.9977	(40±5)%
4	127.04	99.78	12650.93	126.88	99.40	37755.57	0.9979	(50±5)%
5	361.15	131.34	47431.11	127.07	118.83	45212.32	0.9981	(60±5)%
6	360.94	153.26	55315.67	127.26	138.35	52717.43	0.9981	(70±5)%
7	360.57	175.43	63254.93	127.44	157.83	60225.20	0.9980	(80±5)%
8	360.26	197.81	71260.83	127.64	177.29	67762.75	0.9982	(90±5)%
9	360.00	220.18	79262.55	127.84	196.57	75255.32	0.9982	(100±5)%
Supplementary information: Power factor with “+” indicating leading and “-“ indicating lagging.								

4.7	TABLE: Power factor							P
Model: MAX 50KTL3-XL2								
	Input			Output				
No	Voltage (V d.c.)	Current (A d.c.)	Power (W)	Voltage (V a.c.)	Current (A a.c.)	Power (W)	Power factor (+/-)	Rated output (V.A)
1	362.62	29.90	10841.99	126.19	26.54	9994.20	0.9947	(20±5)%
2	362.38	44.33	16063.72	126.33	39.93	15079.91	0.9965	(30±5)%

IEC61727			
Cl.	Requirement - Test	Result	Verdict

3	362.19	58.82	21304.75	126.45	53.11	20088.39	0.9970	(40±5)%
4	361.95	73.20	26493.21	126.58	66.31	25113.15	0.9974	(50±5)%
5	361.76	87.67	31715.18	126.71	79.46	30135.95	0.9977	(60±5)%
6	361.62	102.15	36939.44	126.84	92.61	35160.84	0.9978	(70±5)%
7	361.43	116.69	42175.56	126.97	105.70	40180.35	0.9979	(80±5)%
8	361.24	131.35	47446.70	126.89	119.01	45215.89	0.9981	(90±5)%
9	361.01	145.54	52541.17	127.01	131.64	50063.54	0.9982	(100±5)%
Supplementary information: Power factor with “+” indicating leading and “-“ indicating lagging.								

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.2.1 & 5.4	TABLE: Under-and over-voltage trip settings and reconnection test	P

(1) Under voltage disconnection procedure

Rated output voltage (V)	Output power (VA)	Required min. voltage (V)	Value of PCE trip settings (V)	Ratio of decreased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	107.95	108.0	0.10	4	106.98	1.49
Rated output voltage (V)	Output power (VA)	Required min. voltage (V)	Value of PCE trip settings (V)	Ratio of decreased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	63.5	63.0	0.10	0.1	63.90	0.063

(2) Under voltage reconnection procedure

Ratio of voltage rapidly decreased (V / s)	Reconnection voltage (V)	Reconnection time (s)
0.10	>108	81.2

(3) **Over voltage disconnection procedure**

Rated output voltage (V)	Output power (VA)	Required max. voltage (V)	Value of PCE trip settings (V)	Ratio of increased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	139.7	140	0.10	4	139.7	1.50
Rated output voltage (V)	Output power (VA)	Required max. voltage (V)	Value of PCE trip settings (V)	Ratio of increased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	171.5	172	0.10	0.1	172.2	0.032

(4) Over voltage reconnection procedure

Ratio of voltage rapidly decreased (V / s)	Reconnection voltage (V)	Reconnection time (s)
0.10	<139	80.90

Supplementary information:
Tested on model MAX 75KTL3-XL2

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.2.2 & 5.4	TABLE: Over/under frequency trip settings and reconnection test	P

(1) Under frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required min. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of decreased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
60	75K	59	59	0.01	0.3	59.01	0.185

(2) Under frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	>59	82.2

(3) Over frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required max. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of increased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
60	75K	61	61	0.01	0.3	60.96	0.182

(4) Over frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	<61	80.8

Supplementary information:
Tested on model MAX 75KTL3-XL2 with frequency 60Hz

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.2.2 & 5.4	TABLE: Over/under frequency trip settings and reconnection test	P

(1) Under frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required min. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of decreased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
50	75K	49	49	0.01	0.3	49.01	0.176

(2) Under frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	>49	79.0

(3) Over frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required max. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of increased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
50	75K	51	51	0.01	0.3	50.99	0.193

(4) Over frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	<51	79.0

Supplementary information:
Tested on model MAX 75KTL3-XL2 with frequency 50Hz

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.3	TABLE: tested condition and run-on time	P

Model: Tested on model MAX 75KTL3-XL2 with frequency 50Hz

No.	P_{EUT} (% of EUT rating)	Reactive load (% of normal)	P_{AC}	Q_{AC}	Run-on time(ms)	P_{EUT} (KW)	Actual Q_f (Var)	V_{DC} （V）	Which load is selected to be adjusted (R or L)
Test condition A									
1	100	100	0	0	459.5	75.11	1.00	800	/
2	100	100	-5	-5	332.5	75.11	0.98	800	/
3	100	100	-5	0	279.5	75.11	0.95	800	/
4	100	100	-5	+5	305.0	75.11	0.93	800	/
5	100	100	0	-5	401.0	75.11	1.03	800	/
6	100	100	0	+5	311.5	75.11	0.98	800	/
7	100	100	+5	-5	258.5	75.11	1.08	800	/
8	100	100	+5	0	279.5	75.11	1.06	800	/
9	100	100	+5	+5	157.5	75.11	1.03	800	/
Test condition B									
10	66	66	0	0	299.5	49.68	1.00	520	/
11	66	66	0	-5	196.0	49.68	1.03	520	L
12	66	66	0	-4	292.0	49.68	1.02	520	L
13	66	66	0	-3	287.5	49.68	1.02	520	L
14	66	66	0	-2	243.5	49.68	1.01	520	L
15	66	66	0	-1	242.0	49.68	1.01	520	L
16	66	66	0	1	308.0	49.68	0.99	520	L
17	66	66	0	2	464.0	49.68	0.99	520	L
18	66	66	0	3	415.5	49.68	0.98	520	L
19	66	66	0	4	409.5	49.68	0.98	520	L
20	66	66	0	5	311.5	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	838.0	24.81	1.00	309	/
22	33	33	0	-5	529.0	24.81	1.03	309	L
23	33	33	0	-4	668.0	24.81	1.02	309	L
24	33	33	0	-3	832.0	24.81	1.02	309	L
25	33	33	0	-2	652.0	24.81	1.01	309	L
26	33	33	0	-1	770.0	24.81	1.01	309	L
27	33	33	0	1	716.0	24.81	0.99	309	L
28	33	33	0	2	600.0	24.81	0.99	309	L
29	33	33	0	3	858.0	24.81	0.98	309	L
30	33	33	0	4	612.0	24.81	0.98	309	L
31	33	33	0	5	460.0	24.81	0.97	309	L

IEC61727			
Cl.	Requirement - Test	Result	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.3	TABLE: tested condition and run-on time	P

Model: Tested on model MAX 75KTL3-XL2 with frequency 60Hz

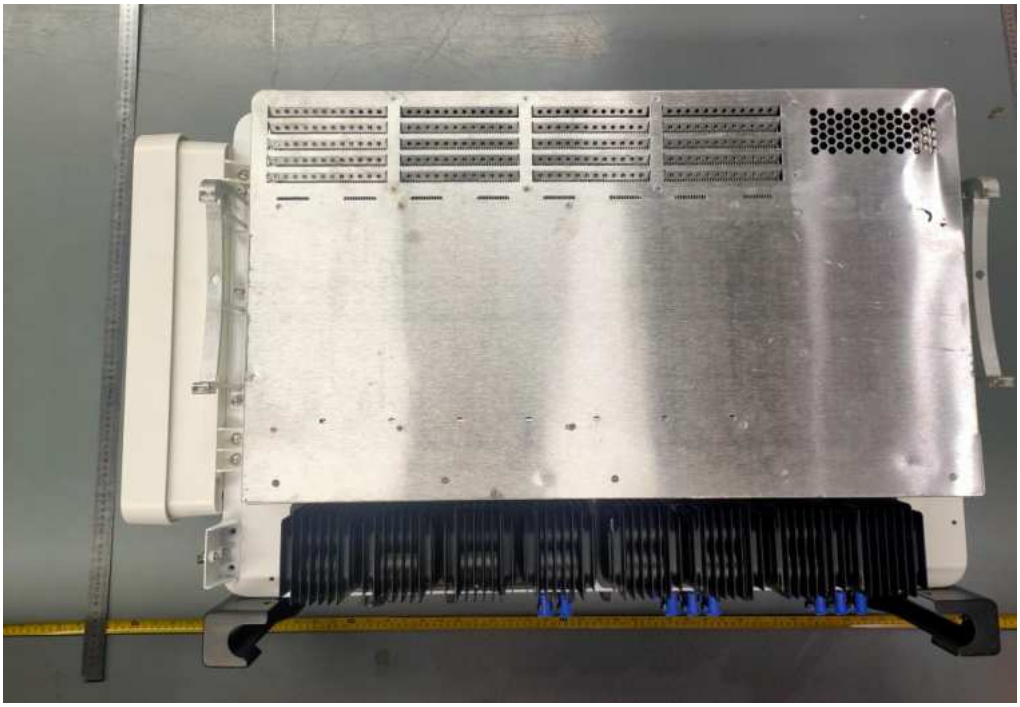
No.	P_{EUT} (% of EUT rating)	Reactive load (% of normal)	P_{AC}	Q_{AC}	Run-on time(ms)	P_{EUT} (KW)	Actual Q_f (Var)	V_{DC} （V）	Which load is selected to be adjusted (R or L)
Test condition A									
1	100	100	0	0	730.0	75.11	1.00	800	/
2	100	100	-5	-5	330.0	75.11	0.97	800	/
3	100	100	-5	0	484.0	75.11	0.95	800	/
4	100	100	-5	+5	414.0	75.11	0.93	800	/
5	100	100	0	-5	322.0	75.11	1.03	800	/
6	100	100	0	+5	256.0	75.11	0.98	800	/
7	100	100	+5	-5	260.0	75.11	1.08	800	/
8	100	100	+5	0	648.0	75.11	1.06	800	/
9	100	100	+5	+5	588.0	75.11	1.04	800	/
Test condition B									
10	66	66	0	0	335.5	49.68	1.00	520	/
11	66	66	0	-5	259.0	49.68	1.03	520	L
12	66	66	0	-4	327.0	49.68	1.02	520	L
13	66	66	0	-3	373.5	49.68	1.02	520	L
14	66	66	0	-2	327.5	49.68	1.01	520	L
15	66	66	0	-1	285.5	49.68	1.01	520	L
16	66	66	0	1	313.0	49.68	0.99	520	L
17	66	66	0	2	629.0	49.68	0.99	520	L
18	66	66	0	3	327.0	49.68	0.98	520	L
19	66	66	0	4	411.0	49.68	0.98	520	L
20	66	66	0	5	299.0	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	530.0	24.81	1.00	309	/
22	33	33	0	-5	134.5	24.81	1.03	309	L
23	33	33	0	-4	192.5	24.81	1.02	309	L
24	33	33	0	-3	178.5	24.81	1.02	309	L
25	33	33	0	-2	226.5	24.81	1.01	309	L
26	33	33	0	-1	234.5	24.81	1.01	309	L
27	33	33	0	1	235.5	24.81	0.99	309	L
28	33	33	0	2	153.5	24.81	0.99	309	L
29	33	33	0	3	182.5	24.81	0.98	309	L
30	33	33	0	4	176.5	24.81	0.98	309	L
31	33	33	0	5	175.5	24.81	0.97	309	L

IEC61727			
Cl.	Requirement - Test	Result	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

Appendix 1: Photos

Top view of the unit



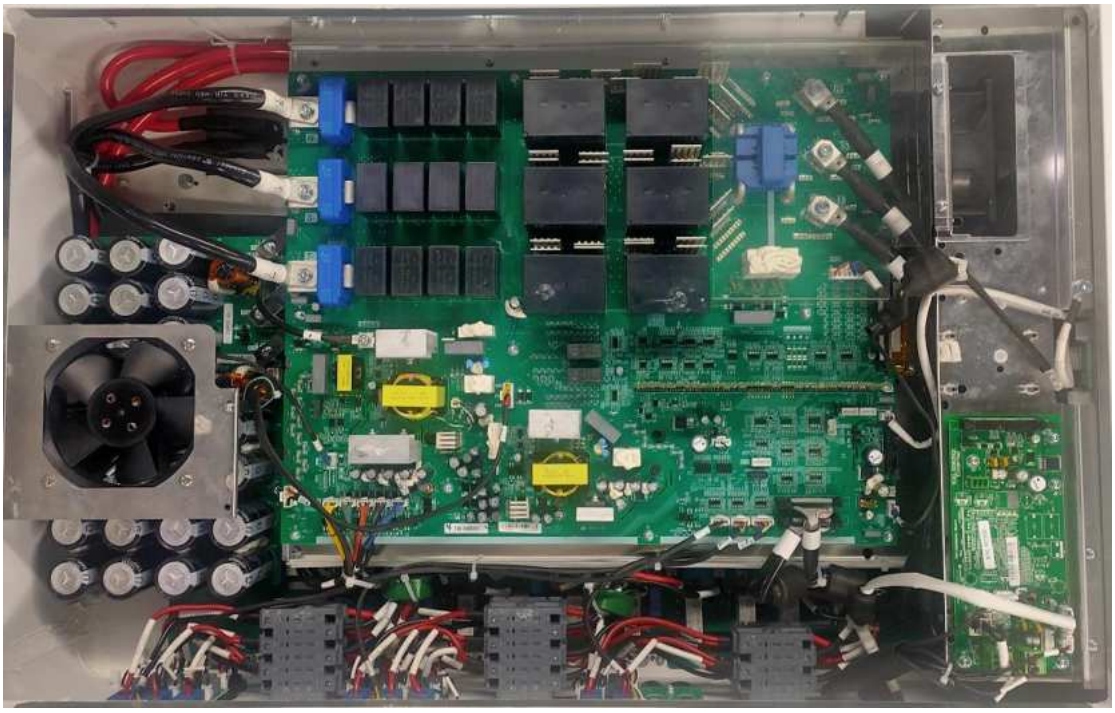
Back view of the unit

Appendix 1: Photos

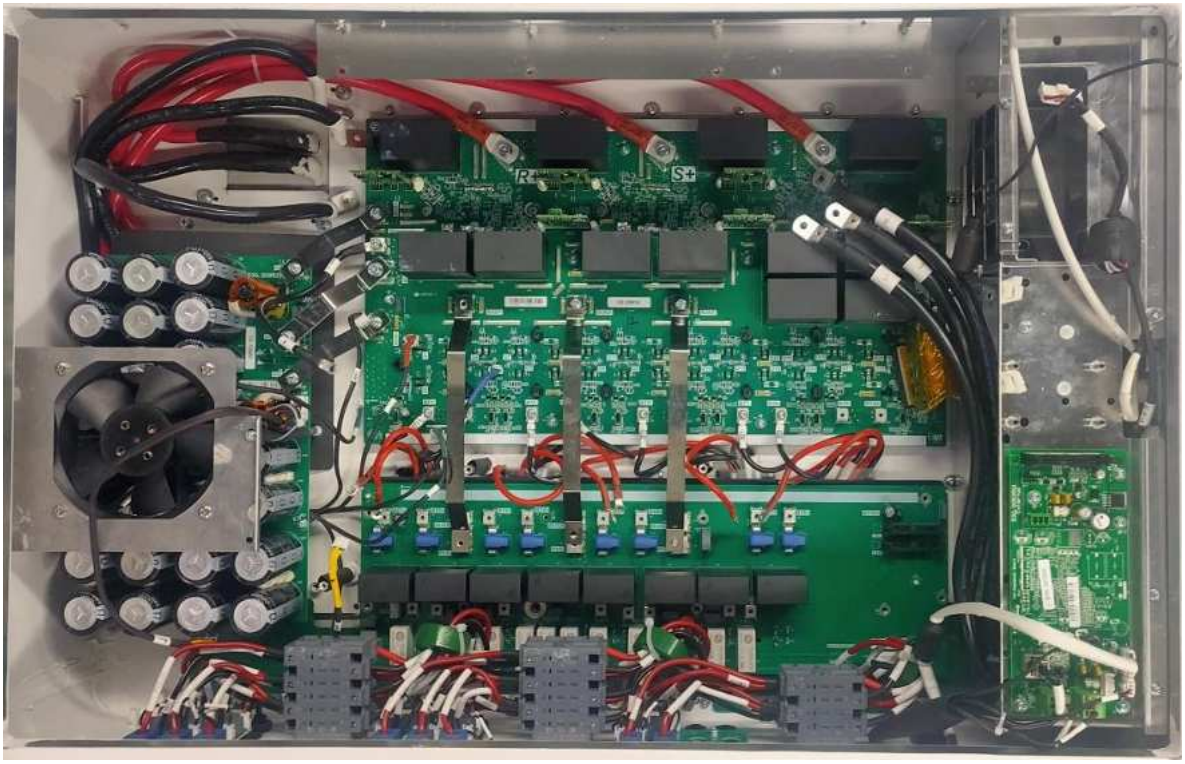
PV Input Terminal view

Side view

Appendix 1: Photos



Internal view



Internal view

--- End of test report---

TL-395

Test Report issued under the responsibility of:

Total Quality. Assured.

TEST REPORT
IEC 62116
Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters

Report Number. .....:	220308046GZU-002
Date of issue .....:	30 May 2022
Total number of pages.....	18 Pages
Name of Testing Laboratory preparing the Report.....:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Applicant's name.....:	Shenzhen Growatt New Energy Co., Ltd.
Address .....:	4-13/F, Building A, Sino-German (Europe) Industrial Park, Hangcheng Ave, Bao'an District, Shenzhen, China
Test specification:	
Standard .....:	IEC 62116:2014
Test procedure .....:	Type approval
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62116B
Test Report Form(s) Originator.....:	TÜV SÜD Product Service GmbH
Master TRF .....:	Dated 2017-11-03

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

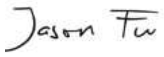
The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description :	PV Grid inverter
Trade Mark ..... :	GROWATT
Manufacturer ..... :	Same as applicant
Model/Type reference :	MAX 50KTL3-XL2, MAX 60KTL3-XL2, MAX 70KTL3-XL2, MAX 73KTL3-XL2 MAX 75KTL3-XL2, MAX 50KTL3-XL1, MAX 60KTL3-XL1, MAX 70KTL3-XL1, MAX 73KTL3-XL1, MAX 75KTL3-XL1

Ratings ..... :

Model	MAX 50KTL3-XL2	MAX 60KTL3-XL2	MAX 70KTL3-XL2	MAX 73KTL3-XL2	MAX 75KTL3-XL2
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	8*45A				
PV Isc	8*56.5A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

Model	MAX 50KTL3-XL1	MAX 60KTL3-XL1	MAX 70KTL3-XL1	MAX 73KTL3-XL1	MAX 75KTL3-XL1
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	10*32A				
PV Isc	10*40A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
Testing location/ address ..... :		Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China	
Tested by (name, function, signature) ..... :		Joss Huang Engineer	
Approved by (name, function, signature) .. :		Jason Fu Supervisor	
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name, function, signature) ..... :		N/A	
Approved by (name, function, signature) .. :		N/A	
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name + signature)..... :		N/A	
Witnessed by (name, function, signature) . :		N/A	
Approved by (name, function, signature) .. :		N/A	
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name, function, signature) ..... :		N/A	
Witnessed by (name, function, signature) . :		N/A	
Approved by (name, function, signature) .. :		N/A	
Supervised by (name, function, signature) :		N/A	

List of Attachments (including a total number of pages in each attachment):
N/A

Summary of testing:

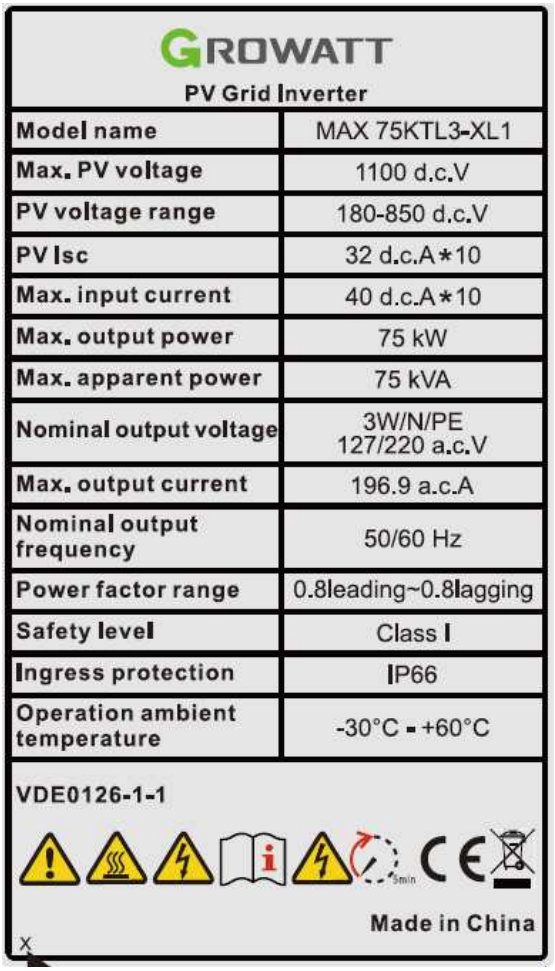
Tests performed (name of test and test clause):	**Testing location:**
All applicable tests	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):
N/A

☒ **The product fulfils the requirements of IEC 62116:2014**

Copy of marking plate:

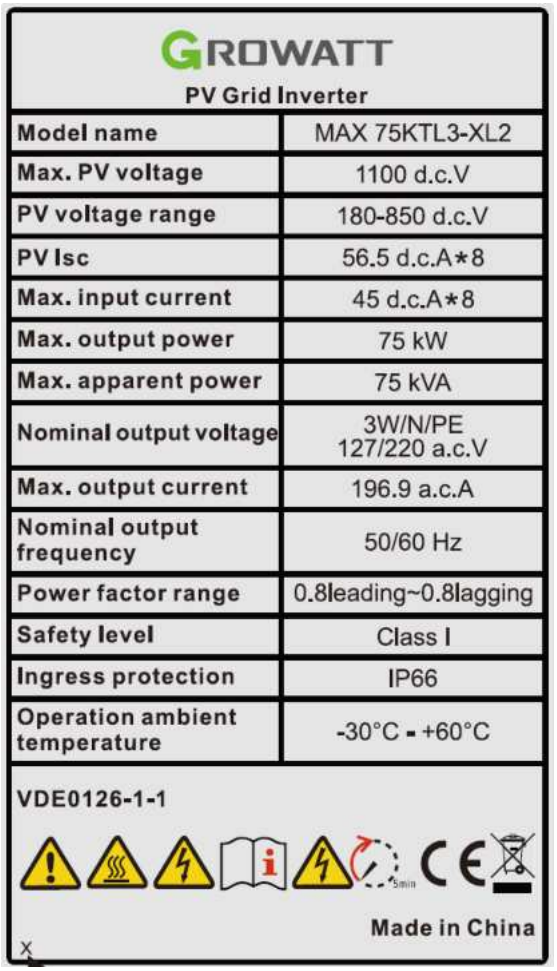
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL1
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	32 d.c.A*10
Max. input current	40 d.c.A*10
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China



GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL2
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	56.5 d.c.A*8
Max. input current	45 d.c.A*8
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China

Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation.
3. Other labels are identical to above, except the model's name and ratings

Test item particulars.....:	
Classification of installation and use.....:	Fixed and outdoor use
Supply Connection.....:	Permanent connection
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	06 April 2022
Date (s) of performance of tests.....:	06 April 2022 to 10 May 2022

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

This report shall be used together with the report 220308046GZU-001.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	Guangdong Growatt New Energy Co., Ltd. Growatt Industrial Park,No.17 Pingheng Road Pingtan Town,Huiyang District,Huizhou, Guangdong,China

General product information:

The unit is a three-phase PV Grid inverter, it can convert the high PV voltage to Grid voltage and feed into Grid network.

The unit is providing EMC filtering at the PV side and AC side. It is transformerless between the PV circuit and AC circuit.

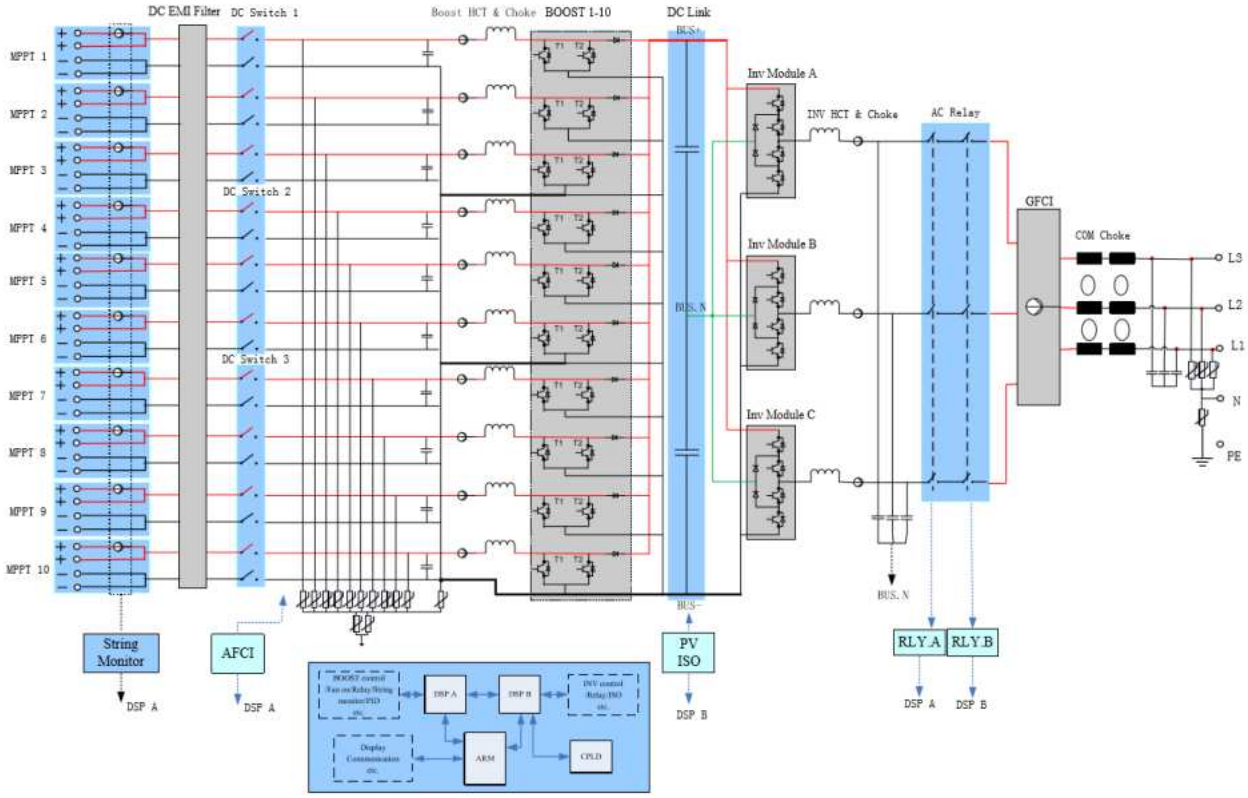
The unit has three controllers. The master controller DSP A measure the PV voltage and current, AFCI, PV ISO and also communicate with the slave controller B and slave controller ARM and etc; The slave controller DSP B is used to INV control and PV ISO measurement and etc.

The slave controller ARM monitor AC voltage, GFCI and communicate with the master controller DSP

The relays are designed to redundant structure that controlled by separately.

The master controller A and slave controller B are used together to control relay open or close, if the single fault on one controller, the other controller can be capable to open the relay, so that still providing safety means.

The topology diagram as following:



Difference of models:

All models are identical, except the number of MPPT and the output power derating in software.

Other than special notice, the model MAX 75KTL3-XL2 is as the representative test model in this report.

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
4	**Testing circuit**		
	The testing circuit shown in Figure 1 is employed.		P
	Similar circuits are used for three-phase output.		P
	Parameters to be measured are shown in Table 1 and Figure 1. Parameters to be recorded in the test report are discussed in Clause 7.		P
5	**Testing equipment**		
5.1	**Measuring instruments**		**P**
	The waveform measurement/capture device is able to record the waveform from the beginning of the islanding test until the EUT ceases to energize the island.	Waveform caught from the switch open and the EUT cease to energize	P
	For multi-phase EUT, all phases are monitored.		P
	A waveform monitor designed to detect and calculate the run-on time may be used.		P
	For multi-phase EUT, the test and measurement equipment is recorded each phase current and each phase-to-neutral or phase-to-phase voltage, as appropriate, to determine fundamental frequency active and reactive power flow over the duration of the test.		P
	A sampling rate of 10 kHz or higher is recommended. The minimum measurement accuracy is 1 % or less of rated EUT nominal output voltage and 1 % or less of rated EUT output current		P
	Current, active power, and reactive power measurements through switch S1 used to determine the circuit balance conditions report the fundamental (50 Hz or 60 Hz) component.		P
5.2	**DC power source**		
5.2.1	**General**		**P**
	A PV array or PV array simulator (preferred) may be used. If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source is not the limiting device as far as the maximum EUT input current is concerned.	Topcon PV simulator used	P
	The DC power source provides voltage and current necessary to meet the testing requirements described in Clause 6.		P
5.2.2	**PV array simulator**		**P**

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	The tests are conducted at the input voltage defined in Table 2 below, and the current is limited to 1,5 times the rated photovoltaic input current, except when specified otherwise by the test requirements.	Topcon PV simulator used	P
	A PV array simulator is recommended, however, any type of power source may be used if it does not influence the test results.		P
5.2.3	**Current and voltage limited DC power supply with series resistance**		N/A
	A DC power source used as the EUT input source is capable of EUT maximum input power (so as to achieve EUT maximum output power) at minimum and maximum EUT input operating voltage.		N/A
	The power source provides adjustable current and voltage limit, set to provide the desired short circuit current and open circuit voltage when combined with the series and shunt resistance described below.		N/A
	A series resistance (and, optionally, a shunt resistance) is selected to provide a fill factor within the range: Output power: Sufficient to provide maximum EUT output power and other levels specified by test conditions of table 5. Response speed: The response time of a simulator to a step in output voltage, due to a 5% load change, results in a settling of the output current to within 10% of its final value in less than 1ms. Stability: Excluding the variations caused by the EUT MPPT, simulator output power remains stable within 2 % of specified power level over the duration of the test: from the point where load balance is achieved until the island condition is cleared or the allowable run-on time is exceeded. Power factor: 0.25 to 0.8		N/A
5.2.4	**PV array**		N/A
	A PV array used as the EUT input source is capable of EUT maximum input power at minimum and maximum EUT input operating voltage.		N/A

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	Testing is limited to times when the irradiance varies by no more than 2 % over the duration of the test as measured by a silicon-type pyranometer or reference device. It may be necessary to adjust the array configuration to achieve the input voltage and power levels prescribed in 6.1.		N/A
5.3	**AC power source**		
	The utility grid or other AC power source may be used as long as it meets the conditions specified in Table 4. **Table 4 – AC power source requirements** Items: Voltage — Conditions: Nominal ±2,0 % Items: Voltage THD — Conditions: < 2,5 % Items: Frequency — Conditions: Nominal ±0,1 Hz Items: Phase angle distance [1] — Conditions: 120 ° ± 1,5 ° [1] Three-phase case only		P
5.4	**AC loads**		
	On the AC side of the EUT, variable resistance, capacitance, and inductance are connected in parallel as loads between the EUT and the AC power source. Other sources of load, such as electronic loads, may be used if it can be shown that the source does not cause results that are different than would be obtained with passive resistors, inductors, and capacitors.		P
	All AC loads are rated for and adjustable to all test conditions. The equations for Qf are based upon an ideal parallel RLC circuit. For this reason, non-inductive resistors, low loss (high Qf) inductors, and capacitors with low effective series resistance and effective series inductance are utilized in the test circuit. Iron core inductors, if used, are not exceed a current THD of 2 % when operated at nominal voltage. Load components are conservatively rated for the voltage and power levels expected. Resistor power ratings are chosen so as to minimize thermally-induced drift in esistance values during the course of the test.		P
	Active and reactive power is calculated (using the measurements provided in Table 1) in each of the R, L and C legs of the load so that these parasitic parameters (and parasitics introduced by variacs or autotransformers) are properly accounted for when calculating Qf.		P

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

6	**Test for single or multi-phase inverter**		
6.1	**Test procedure**	**(see appended table)**	**P**
	The test uses an RLC load, resonant at the EUT nominal frequency (50 Hz or 60 Hz) and matched to the EUT output power.		P
	For multi-phase EUT, the load is balanced across all phases and the switch S1 as in Figure 1 opens all phases		P
	This test is performed with the EUT conditions as in Table 5, where power and voltage values are given as a percent of EUT full output rating.		P
	a)..Determine EUT test output power		P
	b) .Adjusting the DC input source		P
	c) .Turn off the EUT and open S1		P
	d) .Adjust the RLC circuit to have Qf = 1.0 ±0.05		P
	e)..Connect the RLC load configured in step d) to the EUT by closing S2		P
	f) ..Open the utility-disconnect switch S1 to initiate the test, Run-on time is recorded.		P
	g) .For test condition A, adjust the real load and only one of the reactive load components to each of the load imbalance conditions shown in the shaded portion of table 6. If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.		P
	h) For test condition B and C, adjust the only one reactive load components by approximately 1,0% per test, within a total range of 95% to 105% of the operating point. If run-on times are still increasing at the 95% or 105% points, additional 1% increments have to be taken until run-on times begin decreasing.		P
6.2	**Pass/fail criteria**		
	An EUT is considered to comply with the requirements for islanding protection when each case of recorded run-on time is less than 2 s or meets the requirements of local codes.		P
7	**Documentation**		
	At a minimum, the following information is recorded and maintained in the test report.		P
	a) Specifications of EUT. Table 8 provides an example of the type of information that is provided.		P

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	b) Measurement results. Table 9 provides an example of the type of information that is provided. Actual measured values is to be recorded.		P
	c) Block diagram of test circuit.		P
	d) Specifications of the test and measurement equipment. Table 10 provides an example of the type of information that is provided.		P
	e) Any test configuration or procedure details such as methods of achieving specified load and EUT output conditions.		P
	f) Any additional information required by the testing laboratory's accreditation.		P
	g) Specify the evaluation criterion from clause 6.2 that was utilized to determine if the product passed or failed the test.		P
Annex A	Islanding as it applies to PV systems(Informative)		--
A.1	General		--
A.2	Impact of distortion on islanding		--
Annex B	Test for independent islanding detection device (relay)(Informative)		--
B.1	Introduction		--
B.2	Testing circuit		--
B.3	Testing equipment		--
B.4	Testing procedure		--
B.5	Documentation		--

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

6	TABLE: tested condition and run-on time	P

Model: Tested on model MAX 75KTL3-XL2 with frequency 50Hz

No.	P_{EUT} (% of EUT rating)	Reactive load (% of normal)	P_{AC}	Q_{AC}	Run-on time(ms)	P_{EUT} (KW)	Actual Q_f (Var)	V_{DC} （V）	Which load is selected to be adjusted (R or L)
Test condition A									
1	100	100	0	0	459.5	75.11	1.00	800	/
2	100	100	-5	-5	332.5	75.11	0.98	800	/
3	100	100	-5	0	279.5	75.11	0.95	800	/
4	100	100	-5	+5	305.0	75.11	0.93	800	/
5	100	100	0	-5	401.0	75.11	1.03	800	/
6	100	100	0	+5	311.5	75.11	0.98	800	/
7	100	100	+5	-5	258.5	75.11	1.08	800	/
8	100	100	+5	0	279.5	75.11	1.06	800	/
9	100	100	+5	+5	157.5	75.11	1.03	800	/
Test condition B									
10	66	66	0	0	299.5	49.68	1.00	520	/
11	66	66	0	-5	196.0	49.68	1.03	520	L
12	66	66	0	-4	292.0	49.68	1.02	520	L
13	66	66	0	-3	287.5	49.68	1.02	520	L
14	66	66	0	-2	243.5	49.68	1.01	520	L
15	66	66	0	-1	242.0	49.68	1.01	520	L
16	66	66	0	1	308.0	49.68	0.99	520	L
17	66	66	0	2	464.0	49.68	0.99	520	L
18	66	66	0	3	415.5	49.68	0.98	520	L
19	66	66	0	4	409.5	49.68	0.98	520	L
20	66	66	0	5	311.5	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	838.0	24.81	1.00	309	/
22	33	33	0	-5	529.0	24.81	1.03	309	L
23	33	33	0	-4	668.0	24.81	1.02	309	L
24	33	33	0	-3	832.0	24.81	1.02	309	L
25	33	33	0	-2	652.0	24.81	1.01	309	L
26	33	33	0	-1	770.0	24.81	1.01	309	L
27	33	33	0	1	716.0	24.81	0.99	309	L
28	33	33	0	2	600.0	24.81	0.99	309	L
29	33	33	0	3	858.0	24.81	0.98	309	L
30	33	33	0	4	612.0	24.81	0.98	309	L
31	33	33	0	5	460.0	24.81	0.97	309	L

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

6	TABLE: tested condition and run-on time								P
Model: Tested on model MAX 75KTL3-XL2 with frequency 60Hz									
No.	**P_{EUT} (% of EUT rating)**	**Reactive load (% of normal)**	**P_{AC}**	**Q_{AC}**	**Run-on time(ms)**	**P_{EUT} (KW)**	**Actual Q_f (Var)**	**V_{DC} （V）**	**Which load is selected to be adjusted (R or L)**
Test condition A									
1	100	100	0	0	730.0	75.11	1.00	800	/
2	100	100	-5	-5	330.0	75.11	0.97	800	/
3	100	100	-5	0	484.0	75.11	0.95	800	/
4	100	100	-5	+5	414.0	75.11	0.93	800	/
5	100	100	0	-5	322.0	75.11	1.03	800	/
6	100	100	0	+5	256.0	75.11	0.98	800	/
7	100	100	+5	-5	260.0	75.11	1.08	800	/
8	100	100	+5	0	648.0	75.11	1.06	800	/
9	100	100	+5	+5	588.0	75.11	1.04	800	/
Test condition B									
10	66	66	0	0	335.5	49.68	1.00	520	/
11	66	66	0	-5	259.0	49.68	1.03	520	L
12	66	66	0	-4	327.0	49.68	1.02	520	L
13	66	66	0	-3	373.5	49.68	1.02	520	L
14	66	66	0	-2	327.5	49.68	1.01	520	L
15	66	66	0	-1	285.5	49.68	1.01	520	L
16	66	66	0	1	313.0	49.68	0.99	520	L
17	66	66	0	2	629.0	49.68	0.99	520	L
18	66	66	0	3	327.0	49.68	0.98	520	L
19	66	66	0	4	411.0	49.68	0.98	520	L
20	66	66	0	5	299.0	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	530.0	24.81	1.00	309	/
22	33	33	0	-5	134.5	24.81	1.03	309	L
23	33	33	0	-4	192.5	24.81	1.02	309	L
24	33	33	0	-3	178.5	24.81	1.02	309	L
25	33	33	0	-2	226.5	24.81	1.01	309	L
26	33	33	0	-1	234.5	24.81	1.01	309	L
27	33	33	0	1	235.5	24.81	0.99	309	L
28	33	33	0	2	153.5	24.81	0.99	309	L
29	33	33	0	3	182.5	24.81	0.98	309	L
30	33	33	0	4	176.5	24.81	0.98	309	L
31	33	33	0	5	175.5	24.81	0.97	309	L

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

--- End of test report---

Certificate of Conformity

Certificate Number: CN-PV-220113

On the basis of the tests undertaken, the samples of the below product have been found to comply with the requirements of the referenced specifications /standards at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture. The manufacturer shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant:	Shenzhen Growatt New Energy Co., Ltd. 4-13/F, Building A, Sino-German (Europe) Industrial Park, Hangcheng Ave, Bao'an District, Shenzhen, China
Product:	PV Grid inverter
Ratings & Principle Characteristics:	See Appendix to Certificate of Conformity
Model:	MAX 50KTL3-XL2, MAX 60KTL3-XL2, MAX 70KTL3-XL2, MAX 73KTL3-XL2 MAX 75KTL3-XL2, MAX 50KTL3-XL1, MAX 60KTL3-XL1, MAX 70KTL3-XL1, MAX 73KTL3-XL1, MAX 75KTL3-XL1
Brand Name<s>:	GROWATT
Product Complies with:	IEC 61727:2004. Photovoltaic (PV) systems – Characteristics of the utility interface IEC 62116:2014. Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai West Area, 2nd Floor, No. 707, Zhangyang Road China (Shanghai) Pilot Free Trade Zone, Shanghai, P. R. China Accredited by China National Accreditation Service for Conformity Assessment (CNAS C058-P) in accordance with ISO/IEC 17065:2012
Test Report No.<s>:	220308046GZU-001, 220308046GZU-002

Certification procedure: SMS-PV-OP-19
Product certification scheme type: Type test
Additional information in Appendix.

Signature

Certification Manager: Grady Ye
Date: 1 June 2022

中国认可
国际互认
产品
PRODUCT
CNAS C058-P

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-220113

Model	MAX 50KTL3-XL2	MAX 60KTL3-XL2	MAX 70KTL3-XL2	MAX 73KTL3-XL2	MAX 75KTL3-XL2
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	8*45A				
PV Isc	8*56.5A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-220113

Model	MAX 50KTL3-XL1	MAX 60KTL3-XL1	MAX 70KTL3-XL1	MAX 73KTL3-XL1	MAX 75KTL3-XL1
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	10*32A				
PV Isc	10*40A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

TL-395

Test Report issued under the responsibility of:

Total Quality. Assured.

TEST REPORT
IEC 61727
Photovoltaic (PV) systems – Characteristics of the utility interface

Report Number. ..... :	220308046GZU-001
Date of issue ..... :	30 May 2022
Total number of pages ..... :	26 Pages
Name of Testing Laboratory preparing the Report ..... :	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Applicant's name ..... :	Shenzhen Growatt New Energy Co., Ltd.
Address ..... :	4-13/F, Building A, Sino-German (Europe) Industrial Park, Hangcheng Ave, Bao'an District, Shenzhen, China
Test specification:	
Standard ..... :	IEC 61727:2004
Test procedure ..... :	Type approval
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC61727B
Test Report Form(s) Originator .... :	TÜV SÜD Product Service GmbH
Master TRF ..... :	Dated 2017-11-03

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

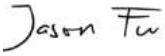
General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description . :	PV Grid inverter
Trade Mark ..... :	GROWATT
Manufacturer..... :	Same as applicant
Model/Type reference :	MAX 50KTL3-XL2, MAX 60KTL3-XL2, MAX 70KTL3-XL2, MAX 73KTL3-XL2 MAX 75KTL3-XL2, MAX 50KTL3-XL1, MAX 60KTL3-XL1, MAX 70KTL3-XL1, MAX 73KTL3-XL1, MAX 75KTL3-XL1
Ratings ..... :	

Model	MAX 50KTL3-XL2	MAX 60KTL3-XL2	MAX 70KTL3-XL2	MAX 73KTL3-XL2	MAX 75KTL3-XL2
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	8*45A				
PV Isc	8*56.5A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				
Model	MAX 50KTL3-XL1	MAX 60KTL3-XL1	MAX 70KTL3-XL1	MAX 73KTL3-XL1	MAX 75KTL3-XL1

	Max.PV voltage	1100Vdc				
	MPPT voltage	180-850Vdc				
	Max.input current	10*32A				
	PV Isc	10*40A				
	Nominal output voltage	3W/N/PE, 127/220Vac				
	Nominal output Frequency	50/60Hz				
	Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
	Max. output power	50KW	60KW	70KW	73KW	75KW
	Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
	Power factor range	0.8Leading~0.8Lagging				
	Safety level	Class I				
	Ingress Protection	IP 66				
	Operation Ambient Temperature	-30℃ - +60℃				
	Software version	TN1.0				

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
Testing location/ address.....:		Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China	
☐	**Associated CB Testing Laboratory:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name, function, signature).....:		Joss Huang Engineer	
Approved by (name, function, signature)...:		Jason Fu Supervisor	
☐	**Testing procedure: TMP/CTF Stage 1:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name, function, signature).....:		N/A	
Approved by (name, function, signature)...:		N/A	
☐	**Testing procedure: WMT/CTF Stage 2:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name + signature) .....:		N/A	
Witnessed by (name, function, signature) .:		N/A	
Approved by (name, function, signature)...:		N/A	
☐	**Testing procedure: SMT/CTF Stage 3 or 4:**	N/A	
Testing location/ address.....:		N/A	
Tested by (name, function, signature).....:		N/A	
Witnessed by (name, function, signature) .:		N/A	
Approved by (name, function, signature)...:		N/A	
Supervised by (name, function, signature) :		N/A	

List of Attachments (including a total number of pages in each attachment):

Appendix 1: photos (3 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All applicable tests	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

Summary of compliance with National Differences:

List of countries addressed

N/A

☒ **The product fulfils the requirements of IEC 61727:2004**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL1
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	32 d.c.A*10
Max. input current	40 d.c.A*10
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China

GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL2
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	56.5 d.c.A*8
Max. input current	45 d.c.A*8
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China

Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation.
3. Other labels are identical to above, except the model's name and ratings

Test item particulars.....:	
Classification of installation and use.....:	Fixed and outdoor use
Supply Connection.....:	Permanent connection
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	06 April 2022
Date (s) of performance of tests.....:	06 April 2022 to 10 May 2022

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

This report shall be used together with the report 220308046GZU-002.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) ..... :	Guangdong Growatt New Energy Co., Ltd. Growatt Industrial Park,No.17 Pingheng Road Pingtan Town,Huiyang District,Huizhou,Guangdong, China

General product information:

The unit is a three-phase PV Grid inverter, it can convert the high PV voltage to Grid voltage and feed into Grid network.

The unit is providing EMC filtering at the PV side and AC side. It is transformerless between the PV circuit and AC circuit.

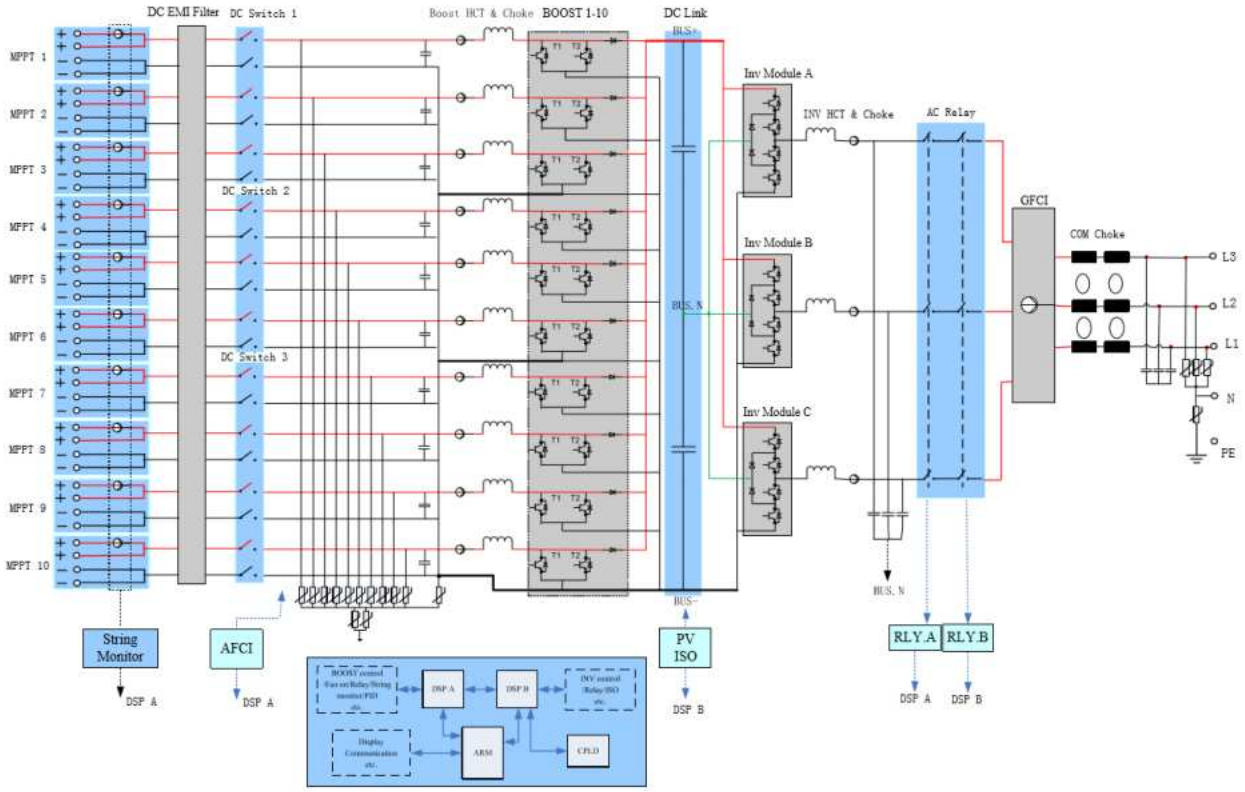
The unit has three controllers. The master controller DSP A measure the PV voltage and current, AFCI, PV ISO and also communicate with the slave controller B and slave controller ARM and etc; The slave controller DSP B is used to INV control and PV ISO measurement and etc.

The slave controller ARM monitor AC voltage, GFCI and communicate with the master controller DSP

The relays are designed to redundant structure that controlled by separately.

The master controller A and slave controller B are used together to control relay open or close, if the single fault on one controller, the other controller can be capable to open the relay, so that still providing safety means.

The topology diagram as following:



Difference of models:

All models are identical, except the number of MPPT and the output power derating in software.

Other than special notice, the model MAX 75KTL3-XL2 is as the representative test model in this report.

IEC61727			
Cl.	Requirement - Test	Result	Verdict

4	**UTILITY COMPATIBILITY**		**P**
	The quality of power provided by the PV system for the on-site AC loads and for power delivered to the utility is governed by practices and standards on voltage, flicker, frequency, harmonics and power factor.		P
	Deviation from these standards represents out-of-bounds conditions and may require the PV system to sense the deviation and properly disconnect from the utility system.		P
4.1	**Voltage, current and frequency**		**P**
	The PV system AC voltage, current and frequency are compatible with the utility system.		P
4.2	**Normal voltage operating range**		**P**
	Utility-interconnected PV systems do not normally regulate voltage, they inject current into the utility. Therefore, the voltage operating range for PV inverters is selected as a protection function that responds to abnormal utility conditions, not as a voltage regulation function.		P
4.3	**Flicker**		**P**
	The operation of the PV system is not cause voltage flicker in excess of limits stated in the relevant sections of IEC 61000-3-3 for systems less than 16 A or IEC 61000-3-5 for systems with current of 16 A and above.		P
4.4	**DC injection**		**P**
	The PV system is not inject DC current greater than 1 % of the rated inverter output current, into the utility AC interface under any operating condition.	(See appended table)	P
4.5	**Normal frequency operating range**		**P**
	The PV system operates in synchronism with the utility system, and within the frequency trip limits defined in 5.2.2.		P
4.6	**Harmonics and waveform distortion**		**P**
	Total harmonic current distortion is less than 5 % at rated inverter output. Each individual harmonic is limited to the percentages listed in Table 1.	(See appended table)	P
	Even harmonics in these ranges is less than 25 % of the lower odd harmonic limits listed.		P

IEC61727			
Cl.	Requirement - Test	Result	Verdict
	Table 1 – Current distortion limits **Odd harmonics** / **Distortion limit** 3rd through 9th — Less than 4,0 % 11th through 15th — Less than 2,0 % 17th through 21st — Less than 1,5 % 23rd through 33rd — Less than 0,6 % **Even harmonics** / **Distortion limit** 2nd through 8th — Less than 1,0 % 10th through 32nd — Less than 0,5 %		P
4.7	The PV system has a lagging power factor greater than 0,9 when the output is greater than 50 % of the rated inverter output power.		P
5	**PERSONNEL SAFETY AND EQUIPMENT PROTECTION**		**P**
	This Clause provides information and considerations for the safe and proper operation of the utility-connected PV systems.		P
5.1	**Loss of utility voltage**		**P**
	To prevent islanding, a utility connected PV system ceases to energize the utility system from a de-energized distribution line irrespective of connected loads or other generators within specified time limits.	Complied with IEC 62116, See the separate report for reference	P
	A utility distribution line can become de-energized for several reasons. For example, a substation breaker opening due to fault conditions or the distribution line switched out during maintenance.		P
5.2	**Over/under voltage and frequency**		**P**
	The abnormal utility conditions of concern are voltage and frequency excursions above or below the values stated in this Clause, and the complete disconnection of the utility, presenting the potential for a distributed resource island.		P
5.2.1	**Over/under voltage**		**P**
	When the interface voltage deviates outside the conditions specified in Table 2, the photovoltaic system ceases to energize the utility distribution system. This applies to any phase of a multiphase system.	(See appended table)	P

IEC61727			
Cl.	Requirement - Test	Result	Verdict

	Table 2 – Response to abnormal voltages Voltage (at point of utility connection) / Maximum trip time* V < 0,5 × Vnominal / 0,1 s 50 % ≤ V < 85 % / 2,0 s 85 % ≤ V ≤ 110 % / Continuous operation 110 % < V < 135 % / 2,0 s 135 % ≤ V / 0,05 s * Trip time refers to the time between the abnormal condition occurring and the inverter ceasing to energize the utility line. The PV system control circuits shall actually remain connected to the utility to allow sensing of utility electrical conditions for use by the "reconnect" feature.		P
5.2.2	**Over/under frequency**		**P**
	When the utility frequency deviates outside the specified conditions the photovoltaic system ceases to energize the utility line. The unit does not have to cease to energize if the frequency returns to the normal utility continuous operation condition within the specified trip time.	(See appended table)	P
	When the utility frequency is outside the range of ±1 Hz, the system ceases to energize the utility line within 0,2 s. The purpose of the allowed range and time delay is to allow continued operation for short-term disturbances and to avoid excessive nuisance tripping in weak-utility system conditions.		P
5.3	**Islanding protection**		**P**
	The PV system must cease to energize the utility line within 2 s of loss of utility.		P
5.4	**Response to utility recovery**		**P**
	Following an out-of-range utility condition that has caused the photovoltaic system to cease energizing, the photovoltaic system is not energize the utility line for 20 s to 5 min after the utility service voltage and frequency have recovered to within the specified ranges.	(See appended table)	P
5.5	**Earthing**		**P**
	The utility interface equipment is earthed/grounded in accordance with IEC 60364-7-712.		P
5.6	**Short circuit protection**		**N/A**
	The photovoltaic system has short-circuit protection in accordance with IEC 60364-7-712.	Should consider in the end use	N/A
5.7	**Isolation and switching**		N/A
	A method of isolation and switching is provided in accordance with IEC 60364-7-712.	Should consider in the end use	N/A

IEC61727			
Cl.	Requirement - Test	Result	Verdict

4.3	TABLE: Flicker			P
Model: MAX 75KTL3-XL2				
	Starting	**Stopping**	**Running**	
Limit	**4%**	**4%**	**Pst = 1.0**	**Plt = 0.65**
Test value L1-N	1.61	2.99	0.58	0.54
Test value L2-N	0.73	2.86	0.59	0.55
Test value L3-N	1.56	2.97	0.59	0.55
Supplementary information:				

4.4	TABLE: Direct current injection								P
Rated output current (A)	**Ratio of rated output power (VA)**	**Measured DC output current between terminals**						**Isolated transformer ? (Yes/No)**	**Limit (mA)**
		L1-L2 (mA)	**L1-L3 (mA)**	**L2-L3 (mA)**	**L1-N (mA)**	**L2-N (mA)**	**L3-N (mA)**		
Model: MAX 75KTL3-XL2									
196.9	25%	--	--	--	215.7	109.0	120.0	No	1969
196.9	50%	--	--	--	152.4	129.9	109.7	No	1969
196.9	100%	--	--	--	582.2	565.3	517.7	No	1969
Model: MAX 50KTL3-XL2									
131.2	25%	--	--	--	486.6	543.9	607.8	No	1312
131.2	50%	--	--	--	497.2	458.9	442.7	No	1312
131.2	100%	--	--	--	535.9	523.3	473.4	No	1312
Supplementary information:									

4.6	TABLE: Harmonics and waveform distortion						P
Model: MAX 75KTL3-XL2							
Harmonic	**fundamental L1 (A)**	**% of fundamental)**	**fundamental L2 (A)**	**% of fundamental)**	**fundamental L3 (A)**	**% of fundamental)**	**Harmonic Current Limits (%)**
02	0.2266	0.1150	0.3814	0.1950	0.1367	0.0700	1.0%
03	0.1721	0.0870	0.2336	0.1190	0.0611	0.0310	4.0%

IEC61727							
Cl.	Requirement - Test				Result		Verdict
04	0.0808	0.0410	0.2005	0.1020	0.1947	0.0990	1.0%
05	3.2068	1.6260	3.3086	1.6870	3.1664	1.6140	4.0%
06	0.0604	0.0310	0.1152	0.0590	0.0354	0.0180	1.0%
07	1.4608	0.7410	1.5422	0.7870	1.3969	0.7120	4.0%
08	0.1153	0.0580	0.1279	0.0650	0.0400	0.0200	1.0%
09	0.0739	0.0370	0.0337	0.0170	0.0909	0.0460	4.0%
10	0.1132	0.0570	0.1368	0.0700	0.1026	0.0520	0.5%
11	0.9060	0.4590	0.8268	0.4220	0.7467	0.3810	2.0%
12	0.0852	0.0430	0.0994	0.0510	0.0952	0.0490	0.5%
13	0.8945	0.4530	0.9354	0.4770	0.9098	0.4640	2.0%
14	0.0512	0.0260	0.0207	0.0110	0.0606	0.0310	0.5%
15	0.0663	0.0340	0.1000	0.0510	0.0634	0.0320	2.0%
16	0.1032	0.0520	0.0936	0.0480	0.1050	0.0540	0.5%
17	0.7812	0.3960	0.7098	0.3620	0.6849	0.3490	1.5%
18	0.0544	0.0280	0.0094	0.0050	0.0707	0.0360	0.5%
19	0.2055	0.1040	0.2316	0.1180	0.2439	0.1240	1.5%
20	0.0586	0.0300	0.0806	0.0410	0.0215	0.0110	0.5%
21	0.0418	0.0210	0.0337	0.0170	0.0346	0.0180	1.5%
22	0.0145	0.0070	0.0337	0.0170	0.0080	0.0040	0.5%
23	0.3791	0.1920	0.3900	0.1990	0.3871	0.1970	0.6%
24	0.0016	0.0010	0.0067	0.0030	0.0073	0.0040	0.5%
25	0.0967	0.0490	0.0858	0.0440	0.0925	0.0470	0.6%
26	0.0475	0.0240	0.0413	0.0210	0.0308	0.0160	0.5%
27	0.0184	0.0090	0.0134	0.0070	0.0085	0.0040	0.6%
28	0.0467	0.0240	0.0219	0.0110	0.0285	0.0150	0.5%
29	0.0642	0.0330	0.0830	0.0420	0.0721	0.0370	0.6%
30	0.0283	0.0140	0.0387	0.0200	0.0091	0.0050	0.5%
31	0.1072	0.0540	0.0982	0.0500	0.1058	0.0540	0.6%
32	0.0075	0.0040	0.0290	0.0150	0.0159	0.0080	0.5%
33	0.0407	0.0210	0.0262	0.0130	0.0203	0.0100	0.6%
THD	1.967		2.039		1.922		5%
Supplementary information:							

IEC61727			
Cl.	Requirement - Test	Result	Verdict

4.6	TABLE: Harmonics and waveform distortion						P
Model: MAX 50KTL3-XL2							
Harmonic	**fundamental L1 (A)**	**% of fundamental)**	**fundamental L2 (A)**	**% of fundamental)**	**fundamental L3 (A)**	**% of fundamental)**	**Harmonic Current Limits (%)**
02	0.1085	0.0820	0.2345	0.1790	0.1366	0.1040	1.0%
03	0.0724	0.0550	0.1052	0.0800	0.0461	0.0350	4.0%
04	0.0952	0.0720	0.1341	0.1020	0.1260	0.0960	1.0%
05	1.4840	1.1230	1.5372	1.1700	1.4581	1.1090	4.0%
06	0.0435	0.0330	0.0754	0.0570	0.0588	0.0450	1.0%
07	0.8371	0.6330	0.9378	0.7140	0.8570	0.6520	4.0%
08	0.0433	0.0330	0.0692	0.0530	0.0332	0.0250	1.0%
09	0.0361	0.0270	0.0271	0.0210	0.0675	0.0510	4.0%
10	0.0115	0.0090	0.0566	0.0430	0.0654	0.0500	0.5%
11	0.5575	0.4220	0.5276	0.4020	0.4949	0.3770	2.0%
12	0.0673	0.0510	0.0855	0.0650	0.0683	0.0520	0.5%
13	0.4533	0.3430	0.4605	0.3510	0.4722	0.3590	2.0%
14	0.0546	0.0410	0.0302	0.0230	0.0387	0.0290	0.5%
15	0.0280	0.0210	0.0137	0.0100	0.0343	0.0260	2.0%
16	0.0411	0.0310	0.0446	0.0340	0.0077	0.0060	0.5%
17	0.6799	0.5140	0.6253	0.4760	0.6337	0.4820	1.5%
18	0.0280	0.0210	0.0309	0.0240	0.0342	0.0260	0.5%
19	0.1276	0.0970	0.1231	0.0940	0.1045	0.0800	1.5%
20	0.0406	0.0310	0.0573	0.0440	0.0133	0.0100	0.5%
21	0.0252	0.0190	0.0189	0.0140	0.0069	0.0050	1.5%
22	0.0167	0.0130	0.0219	0.0170	0.0280	0.0210	0.5%
23	0.2891	0.2190	0.2797	0.2130	0.2477	0.1880	0.6%
24	0.0251	0.0190	0.0264	0.0200	0.0378	0.0290	0.5%
25	0.0961	0.0730	0.1082	0.0820	0.0522	0.0400	0.6%
26	0.0131	0.0100	0.0431	0.0330	0.0266	0.0200	0.5%
27	0.0304	0.0230	0.0084	0.0060	0.0198	0.0150	0.6%
28	0.0420	0.0320	0.0503	0.0380	0.0717	0.0550	0.5%
29	0.0451	0.0340	0.0461	0.0350	0.0670	0.0510	0.6%

IEC61727			
Cl.	Requirement - Test	Result	Verdict

30	0.0197	0.0150	0.0246	0.0190	0.0189	0.0140	0.5%
31	0.0624	0.0470	0.1120	0.0850	0.0753	0.0570	0.6%
32	0.0039	0.0030	0.0193	0.0150	0.0355	0.0270	0.5%
33	0.0189	0.0140	0.0162	0.0120	0.0378	0.0290	0.6%
THD	1.530		1.596		1.507		5%
Supplementary information:							

4.7	TABLE: Power factor							P
Model: MAX 75KTL3-XL2								
	Input			Output				
No	Voltage (V d.c.)	Current (A d.c.)	Power (W)	Voltage (V a.c.)	Current (A a.c.)	Power (W)	Power factor (+/-)	Rated output (V.A)
1	362.38	44.59	16155.43	126.32	40.16	15163.87	0.9963	(20±5)%
2	362.15	66.08	23929.70	126.51	60.00	22707.25	0.9972	(30±5)%
3	361.78	87.82	31769.51	126.70	79.81	30263.72	0.9977	(40±5)%
4	127.04	99.78	12650.93	126.88	99.40	37755.57	0.9979	(50±5)%
5	361.15	131.34	47431.11	127.07	118.83	45212.32	0.9981	(60±5)%
6	360.94	153.26	55315.67	127.26	138.35	52717.43	0.9981	(70±5)%
7	360.57	175.43	63254.93	127.44	157.83	60225.20	0.9980	(80±5)%
8	360.26	197.81	71260.83	127.64	177.29	67762.75	0.9982	(90±5)%
9	360.00	220.18	79262.55	127.84	196.57	75255.32	0.9982	(100±5)%
Supplementary information: Power factor with “+” indicating leading and “-“ indicating lagging.								

4.7	TABLE: Power factor							P
Model: MAX 50KTL3-XL2								
	Input			Output				
No	Voltage (V d.c.)	Current (A d.c.)	Power (W)	Voltage (V a.c.)	Current (A a.c.)	Power (W)	Power factor (+/-)	Rated output (V.A)
1	362.62	29.90	10841.99	126.19	26.54	9994.20	0.9947	(20±5)%
2	362.38	44.33	16063.72	126.33	39.93	15079.91	0.9965	(30±5)%

IEC61727			
Cl.	Requirement - Test	Result	Verdict

3	362.19	58.82	21304.75	126.45	53.11	20088.39	0.9970	(40±5)%
4	361.95	73.20	26493.21	126.58	66.31	25113.15	0.9974	(50±5)%
5	361.76	87.67	31715.18	126.71	79.46	30135.95	0.9977	(60±5)%
6	361.62	102.15	36939.44	126.84	92.61	35160.84	0.9978	(70±5)%
7	361.43	116.69	42175.56	126.97	105.70	40180.35	0.9979	(80±5)%
8	361.24	131.35	47446.70	126.89	119.01	45215.89	0.9981	(90±5)%
9	361.01	145.54	52541.17	127.01	131.64	50063.54	0.9982	(100±5)%
Supplementary information: Power factor with “+” indicating leading and “-“ indicating lagging.								

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.2.1 & 5.4	TABLE: Under-and over-voltage trip settings and reconnection test	P

(1) Under voltage disconnection procedure

Rated output voltage (V)	Output power (VA)	Required min. voltage (V)	Value of PCE trip settings (V)	Ratio of decreased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	107.95	108.0	0.10	4	106.98	1.49
Rated output voltage (V)	Output power (VA)	Required min. voltage (V)	Value of PCE trip settings (V)	Ratio of decreased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	63.5	63.0	0.10	0.1	63.90	0.063

(2) Under voltage reconnection procedure

Ratio of voltage rapidly decreased (V / s)	Reconnection voltage (V)	Reconnection time (s)
0.10	>108	81.2

(3) **Over voltage disconnection procedure**

Rated output voltage (V)	Output power (VA)	Required max. voltage (V)	Value of PCE trip settings (V)	Ratio of increased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	139.7	140	0.10	4	139.7	1.50
Rated output voltage (V)	Output power (VA)	Required max. voltage (V)	Value of PCE trip settings (V)	Ratio of increased (V / s)	Interval time (s)	Measured tripped voltage (V)	Measured disconnection time (s)
127	75K	171.5	172	0.10	0.1	172.2	0.032

(4) Over voltage reconnection procedure

Ratio of voltage rapidly decreased (V / s)	Reconnection voltage (V)	Reconnection time (s)
0.10	<139	80.90

Supplementary information:
Tested on model MAX 75KTL3-XL2

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.2.2 & 5.4	TABLE: Over/under frequency trip settings and reconnection test	P

(1) Under frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required min. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of decreased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
60	75K	59	59	0.01	0.3	59.01	0.185

(2) Under frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	>59	82.2

(3) Over frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required max. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of increased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
60	75K	61	61	0.01	0.3	60.96	0.182

(4) Over frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	<61	80.8

Supplementary information:
Tested on model MAX 75KTL3-XL2 with frequency 60Hz

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.2.2 & 5.4	TABLE: Over/under frequency trip settings and reconnection test	P

(1) Under frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required min. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of decreased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
50	75K	49	49	0.01	0.3	49.01	0.176

(2) Under frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	>49	79.0

(3) Over frequency disconnection procedure

Rated output frequency (Hz)	Output power (VA)	Required max. frequency (Hz)	Value of PCE trip settings (Hz)	Ratio of increased (Hz / s)	Interval time (s)	Measured tripped frequency (Hz)	Measured disconnection time (s)
50	75K	51	51	0.01	0.3	50.99	0.193

(4) Over frequency reconnection procedure

Ratio of frequency rapidly decreased (Hz / s)	Reconnection frequency (Hz)	Reconnection time (s)
0.01	<51	79.0

Supplementary information:
Tested on model MAX 75KTL3-XL2 with frequency 50Hz

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.3	TABLE: tested condition and run-on time	P

Model: Tested on model MAX 75KTL3-XL2 with frequency 50Hz

No.	P_{EUT} (% of EUT rating)	Reactive load (% of normal)	P_{AC}	Q_{AC}	Run-on time(ms)	P_{EUT} (KW)	Actual Q_f (Var)	V_{DC} （V）	Which load is selected to be adjusted (R or L)
Test condition A									
1	100	100	0	0	459.5	75.11	1.00	800	/
2	100	100	-5	-5	332.5	75.11	0.98	800	/
3	100	100	-5	0	279.5	75.11	0.95	800	/
4	100	100	-5	+5	305.0	75.11	0.93	800	/
5	100	100	0	-5	401.0	75.11	1.03	800	/
6	100	100	0	+5	311.5	75.11	0.98	800	/
7	100	100	+5	-5	258.5	75.11	1.08	800	/
8	100	100	+5	0	279.5	75.11	1.06	800	/
9	100	100	+5	+5	157.5	75.11	1.03	800	/
Test condition B									
10	66	66	0	0	299.5	49.68	1.00	520	/
11	66	66	0	-5	196.0	49.68	1.03	520	L
12	66	66	0	-4	292.0	49.68	1.02	520	L
13	66	66	0	-3	287.5	49.68	1.02	520	L
14	66	66	0	-2	243.5	49.68	1.01	520	L
15	66	66	0	-1	242.0	49.68	1.01	520	L
16	66	66	0	1	308.0	49.68	0.99	520	L
17	66	66	0	2	464.0	49.68	0.99	520	L
18	66	66	0	3	415.5	49.68	0.98	520	L
19	66	66	0	4	409.5	49.68	0.98	520	L
20	66	66	0	5	311.5	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	838.0	24.81	1.00	309	/
22	33	33	0	-5	529.0	24.81	1.03	309	L
23	33	33	0	-4	668.0	24.81	1.02	309	L
24	33	33	0	-3	832.0	24.81	1.02	309	L
25	33	33	0	-2	652.0	24.81	1.01	309	L
26	33	33	0	-1	770.0	24.81	1.01	309	L
27	33	33	0	1	716.0	24.81	0.99	309	L
28	33	33	0	2	600.0	24.81	0.99	309	L
29	33	33	0	3	858.0	24.81	0.98	309	L
30	33	33	0	4	612.0	24.81	0.98	309	L
31	33	33	0	5	460.0	24.81	0.97	309	L

IEC61727			
Cl.	Requirement - Test	Result	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

IEC61727			
Cl.	Requirement - Test	Result	Verdict

5.3	TABLE: tested condition and run-on time	P

Model: Tested on model MAX 75KTL3-XL2 with frequency 60Hz

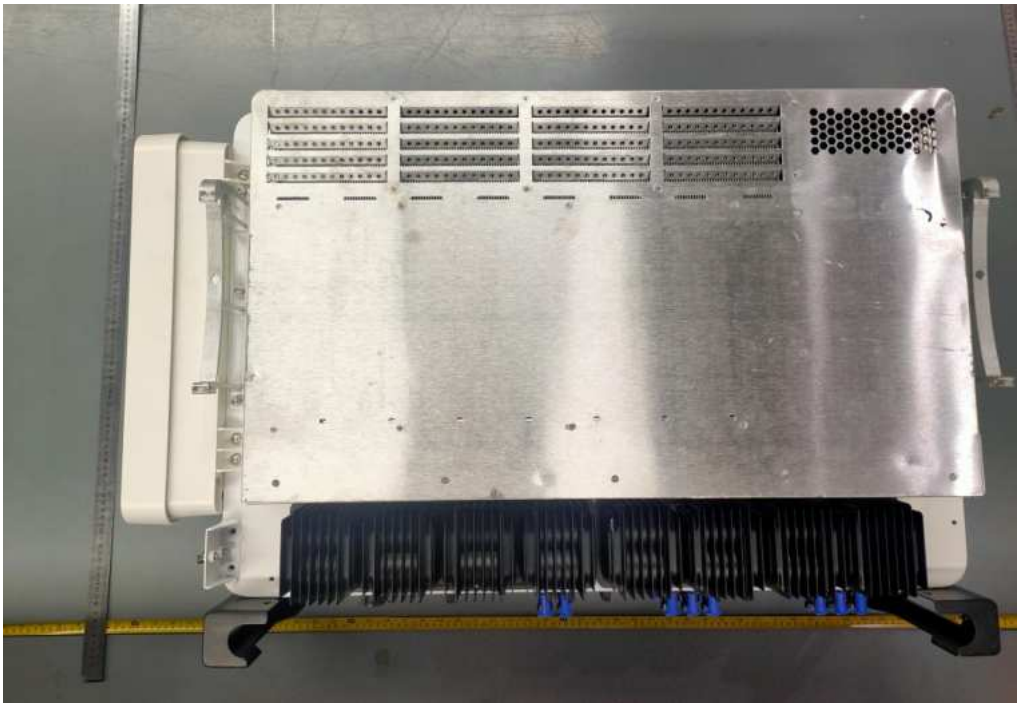
No.	P_{EUT} (% of EUT rating)	Reactive load (% of normal)	P_{AC}	Q_{AC}	Run-on time(ms)	P_{EUT} (KW)	Actual Q_f (Var)	V_{DC} （V）	Which load is selected to be adjusted (R or L)
Test condition A									
1	100	100	0	0	730.0	75.11	1.00	800	/
2	100	100	-5	-5	330.0	75.11	0.97	800	/
3	100	100	-5	0	484.0	75.11	0.95	800	/
4	100	100	-5	+5	414.0	75.11	0.93	800	/
5	100	100	0	-5	322.0	75.11	1.03	800	/
6	100	100	0	+5	256.0	75.11	0.98	800	/
7	100	100	+5	-5	260.0	75.11	1.08	800	/
8	100	100	+5	0	648.0	75.11	1.06	800	/
9	100	100	+5	+5	588.0	75.11	1.04	800	/
Test condition B									
10	66	66	0	0	335.5	49.68	1.00	520	/
11	66	66	0	-5	259.0	49.68	1.03	520	L
12	66	66	0	-4	327.0	49.68	1.02	520	L
13	66	66	0	-3	373.5	49.68	1.02	520	L
14	66	66	0	-2	327.5	49.68	1.01	520	L
15	66	66	0	-1	285.5	49.68	1.01	520	L
16	66	66	0	1	313.0	49.68	0.99	520	L
17	66	66	0	2	629.0	49.68	0.99	520	L
18	66	66	0	3	327.0	49.68	0.98	520	L
19	66	66	0	4	411.0	49.68	0.98	520	L
20	66	66	0	5	299.0	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	530.0	24.81	1.00	309	/
22	33	33	0	-5	134.5	24.81	1.03	309	L
23	33	33	0	-4	192.5	24.81	1.02	309	L
24	33	33	0	-3	178.5	24.81	1.02	309	L
25	33	33	0	-2	226.5	24.81	1.01	309	L
26	33	33	0	-1	234.5	24.81	1.01	309	L
27	33	33	0	1	235.5	24.81	0.99	309	L
28	33	33	0	2	153.5	24.81	0.99	309	L
29	33	33	0	3	182.5	24.81	0.98	309	L
30	33	33	0	4	176.5	24.81	0.98	309	L
31	33	33	0	5	175.5	24.81	0.97	309	L

IEC61727			
Cl.	Requirement - Test	Result	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

Appendix 1: Photos

Top view of the unit



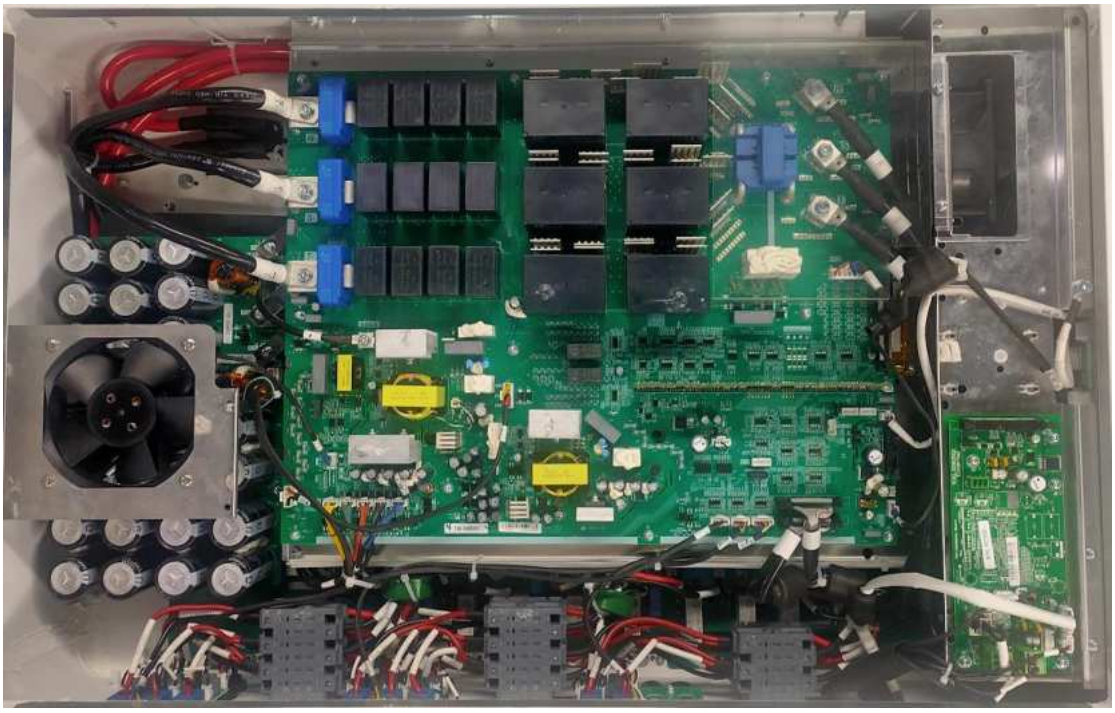
Back view of the unit

Appendix 1: Photos

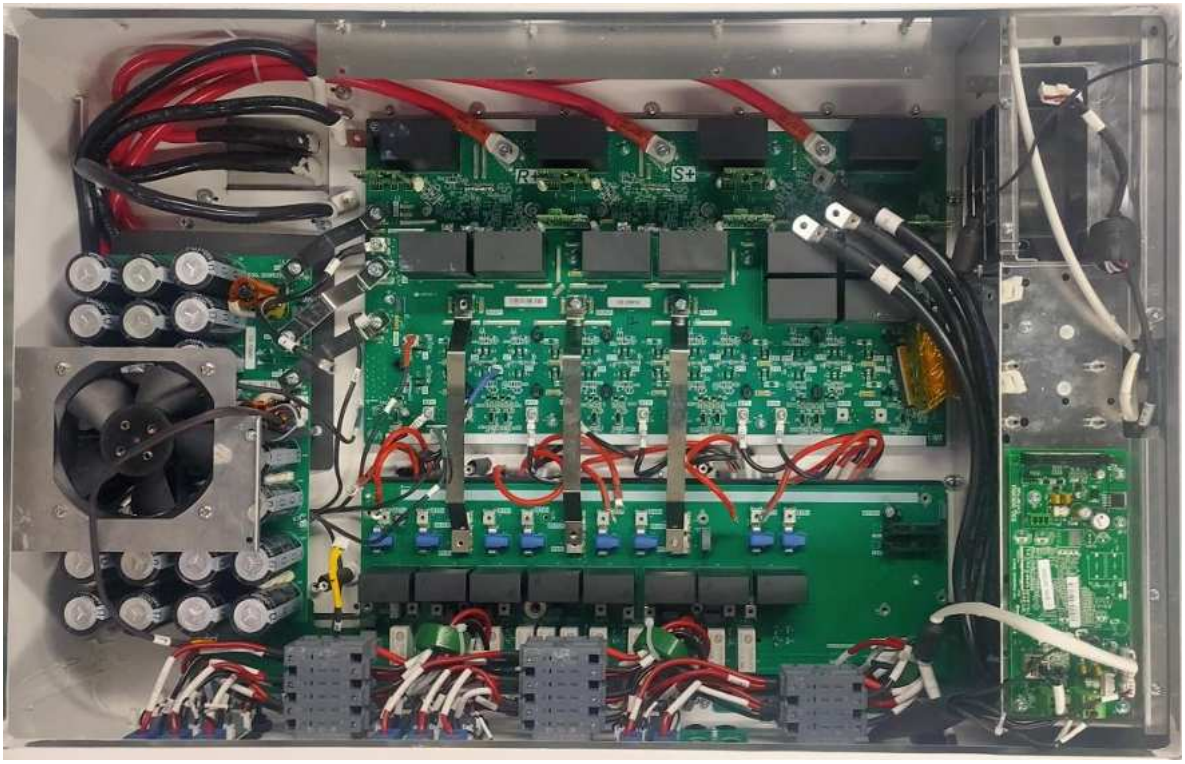
PV Input Terminal view

Side view

Appendix 1: Photos



Internal view



Internal view

--- End of test report---

TL-395

Test Report issued under the responsibility of:

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TEST REPORT
IEC 62116
Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters

Report Number. .....:	220308046GZU-002
Date of issue .....:	30 May 2022
Total number of pages.....	18 Pages
Name of Testing Laboratory preparing the Report.....:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Applicant's name.....:	Shenzhen Growatt New Energy Co., Ltd.
Address .....:	4-13/F, Building A, Sino-German (Europe) Industrial Park, Hangcheng Ave, Bao'an District, Shenzhen, China
Test specification:	
Standard .....:	IEC 62116:2014
Test procedure .....:	Type approval
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62116B
Test Report Form(s) Originator.....:	TÜV SÜD Product Service GmbH
Master TRF .....:	Dated 2017-11-03

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

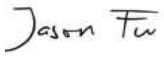
The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description :	PV Grid inverter
Trade Mark ..... :	GROWATT
Manufacturer ..... :	Same as applicant
Model/Type reference :	MAX 50KTL3-XL2, MAX 60KTL3-XL2, MAX 70KTL3-XL2, MAX 73KTL3-XL2 MAX 75KTL3-XL2, MAX 50KTL3-XL1, MAX 60KTL3-XL1, MAX 70KTL3-XL1, MAX 73KTL3-XL1, MAX 75KTL3-XL1

Ratings ..... :

Model	MAX 50KTL3-XL2	MAX 60KTL3-XL2	MAX 70KTL3-XL2	MAX 73KTL3-XL2	MAX 75KTL3-XL2
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	8*45A				
PV Isc	8*56.5A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

Model	MAX 50KTL3-XL1	MAX 60KTL3-XL1	MAX 70KTL3-XL1	MAX 73KTL3-XL1	MAX 75KTL3-XL1
Max.PV voltage	1100Vdc				
MPPT voltage	180-850Vdc				
Max.input current	10*32A				
PV Isc	10*40A				
Nominal output voltage	3W/N/PE, 127/220Vac				
Nominal output Frequency	50/60Hz				
Max.output current	144.3A	173.2A	183.7A	191.6A	196.9A
Max. output power	50KW	60KW	70KW	73KW	75KW
Max. apparent power	55KVA	66KVA	70KVA	73KVA	75KVA
Power factor range	0.8Leading~0.8Lagging				
Safety level	Class I				
Ingress Protection	IP 66				
Operation Ambient Temperature	-30℃ - +60℃				
Software version	TN1.0				

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
Testing location/ address ..... :		Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China	
Tested by (name, function, signature) ..... :		Joss Huang Engineer	
Approved by (name, function, signature) .. :		Jason Fu Supervisor	
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name, function, signature) ..... :		N/A	
Approved by (name, function, signature) .. :		N/A	
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name + signature)..... :		N/A	
Witnessed by (name, function, signature) . :		N/A	
Approved by (name, function, signature) .. :		N/A	
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name, function, signature) ..... :		N/A	
Witnessed by (name, function, signature) . :		N/A	
Approved by (name, function, signature) .. :		N/A	
Supervised by (name, function, signature) :		N/A	

List of Attachments (including a total number of pages in each attachment):
N/A

Summary of testing:

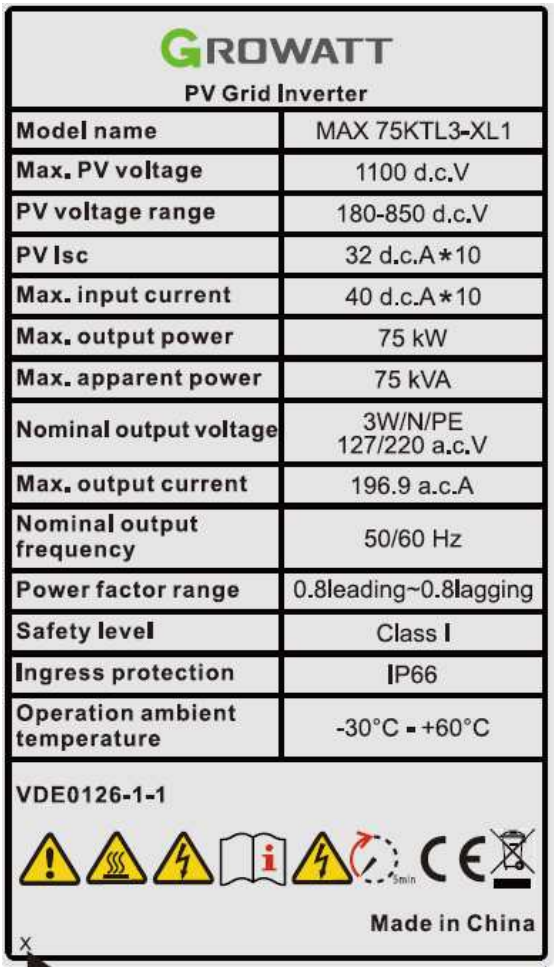
Tests performed (name of test and test clause):	**Testing location:**
All applicable tests	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):
N/A

☒ **The product fulfils the requirements of IEC 62116:2014**

Copy of marking plate:

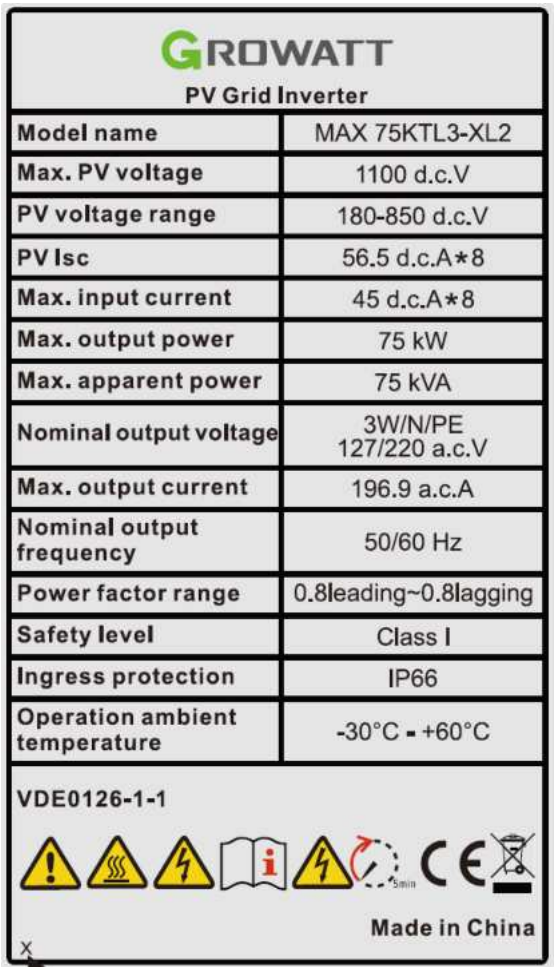
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL1
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	32 d.c.A*10
Max. input current	40 d.c.A*10
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China



GROWATT PV Grid Inverter	
Model name	MAX 75KTL3-XL2
Max. PV voltage	1100 d.c.V
PV voltage range	180-850 d.c.V
PV Isc	56.5 d.c.A*8
Max. input current	45 d.c.A*8
Max. output power	75 kW
Max. apparent power	75 kVA
Nominal output voltage	3W/N/PE 127/220 a.c.V
Max. output current	196.9 a.c.A
Nominal output frequency	50/60 Hz
Power factor range	0.8leading~0.8lagging
Safety level	Class I
Ingress protection	IP66
Operation ambient temperature	-30°C - +60°C

VDE0126-1-1

Made in China

Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation.
3. Other labels are identical to above, except the model's name and ratings

Test item particulars.....:	
Classification of installation and use.....:	Fixed and outdoor use
Supply Connection.....:	Permanent connection
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	06 April 2022
Date (s) of performance of tests.....:	06 April 2022 to 10 May 2022

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

This report shall be used together with the report 220308046GZU-001.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	Guangdong Growatt New Energy Co., Ltd. Growatt Industrial Park,No.17 Pingheng Road Pingtan Town,Huiyang District,Huizhou, Guangdong,China

General product information:

The unit is a three-phase PV Grid inverter, it can convert the high PV voltage to Grid voltage and feed into Grid network.

The unit is providing EMC filtering at the PV side and AC side. It is transformerless between the PV circuit and AC circuit.

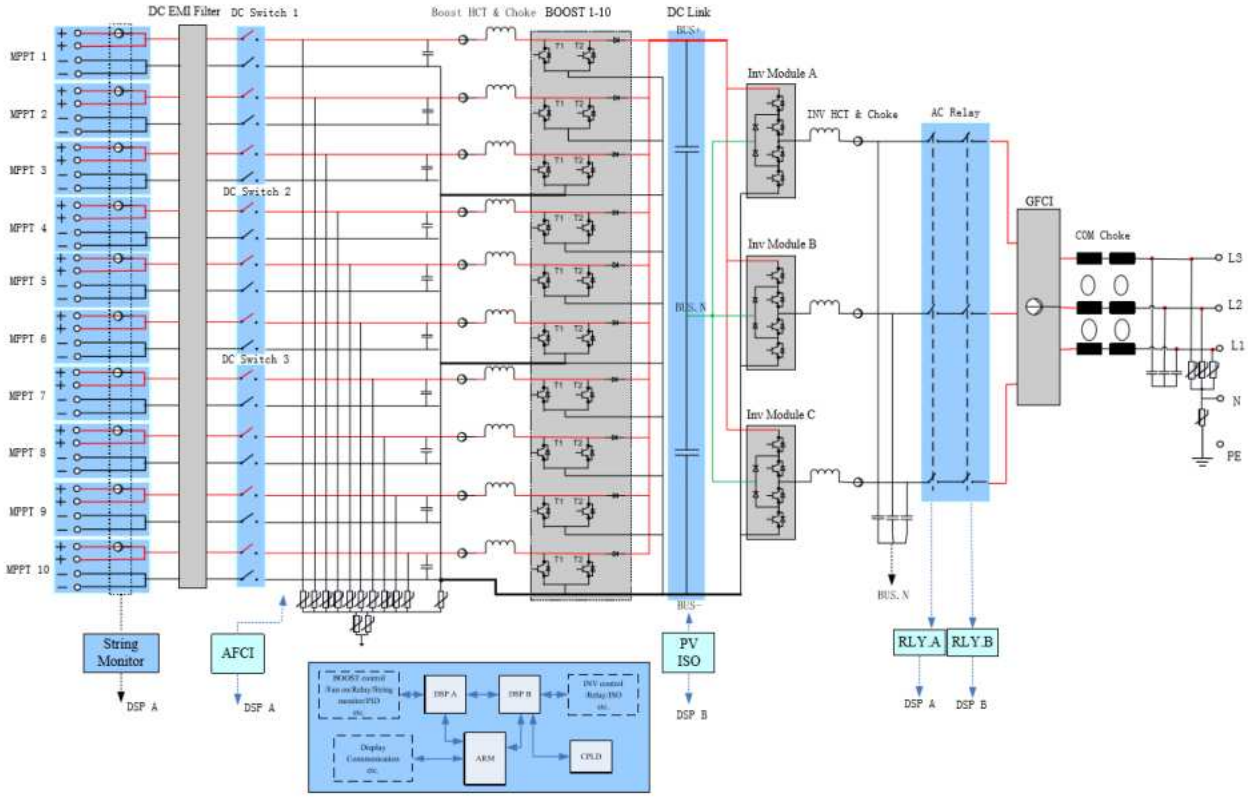
The unit has three controllers. The master controller DSP A measure the PV voltage and current, AFCI, PV ISO and also communicate with the slave controller B and slave controller ARM and etc; The slave controller DSP B is used to INV control and PV ISO measurement and etc.

The slave controller ARM monitor AC voltage, GFCI and communicate with the master controller DSP

The relays are designed to redundant structure that controlled by separately.

The master controller A and slave controller B are used together to control relay open or close, if the single fault on one controller, the other controller can be capable to open the relay, so that still providing safety means.

The topology diagram as following:



Difference of models:

All models are identical, except the number of MPPT and the output power derating in software.

Other than special notice, the model MAX 75KTL3-XL2 is as the representative test model in this report.

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
4	**Testing circuit**		
	The testing circuit shown in Figure 1 is employed.		P
	Similar circuits are used for three-phase output.		P
	Parameters to be measured are shown in Table 1 and Figure 1. Parameters to be recorded in the test report are discussed in Clause 7.		P
5	**Testing equipment**		
5.1	**Measuring instruments**		**P**
	The waveform measurement/capture device is able to record the waveform from the beginning of the islanding test until the EUT ceases to energize the island.	Waveform caught from the switch open and the EUT cease to energize	P
	For multi-phase EUT, all phases are monitored.		P
	A waveform monitor designed to detect and calculate the run-on time may be used.		P
	For multi-phase EUT, the test and measurement equipment is recorded each phase current and each phase-to-neutral or phase-to-phase voltage, as appropriate, to determine fundamental frequency active and reactive power flow over the duration of the test.		P
	A sampling rate of 10 kHz or higher is recommended. The minimum measurement accuracy is 1 % or less of rated EUT nominal output voltage and 1 % or less of rated EUT output current		P
	Current, active power, and reactive power measurements through switch S1 used to determine the circuit balance conditions report the fundamental (50 Hz or 60 Hz) component.		P
5.2	**DC power source**		
5.2.1	**General**		**P**
	A PV array or PV array simulator (preferred) may be used. If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source is not the limiting device as far as the maximum EUT input current is concerned.	Topcon PV simulator used	P
	The DC power source provides voltage and current necessary to meet the testing requirements described in Clause 6.		P
5.2.2	**PV array simulator**		**P**

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	The tests are conducted at the input voltage defined in Table 2 below, and the current is limited to 1,5 times the rated photovoltaic input current, except when specified otherwise by the test requirements.	Topcon PV simulator used	P
	A PV array simulator is recommended, however, any type of power source may be used if it does not influence the test results.		P
5.2.3	**Current and voltage limited DC power supply with series resistance**		N/A
	A DC power source used as the EUT input source is capable of EUT maximum input power (so as to achieve EUT maximum output power) at minimum and maximum EUT input operating voltage.		N/A
	The power source provides adjustable current and voltage limit, set to provide the desired short circuit current and open circuit voltage when combined with the series and shunt resistance described below.		N/A
	A series resistance (and, optionally, a shunt resistance) is selected to provide a fill factor within the range: Output power: Sufficient to provide maximum EUT output power and other levels specified by test conditions of table 5. Response speed: The response time of a simulator to a step in output voltage, due to a 5% load change, results in a settling of the output current to within 10% of its final value in less than 1ms. Stability: Excluding the variations caused by the EUT MPPT, simulator output power remains stable within 2 % of specified power level over the duration of the test: from the point where load balance is achieved until the island condition is cleared or the allowable run-on time is exceeded. Power factor: 0.25 to 0.8		N/A
5.2.4	**PV array**		N/A
	A PV array used as the EUT input source is capable of EUT maximum input power at minimum and maximum EUT input operating voltage.		N/A

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	Testing is limited to times when the irradiance varies by no more than 2 % over the duration of the test as measured by a silicon-type pyranometer or reference device. It may be necessary to adjust the array configuration to achieve the input voltage and power levels prescribed in 6.1.		N/A
5.3	**AC power source**		
	The utility grid or other AC power source may be used as long as it meets the conditions specified in Table 4. **Table 4 – AC power source requirements** Items: Voltage — Conditions: Nominal ±2,0 % Items: Voltage THD — Conditions: < 2,5 % Items: Frequency — Conditions: Nominal ±0,1 Hz Items: Phase angle distance [1] — Conditions: 120 ° ± 1,5 ° [1] Three-phase case only		P
5.4	**AC loads**		
	On the AC side of the EUT, variable resistance, capacitance, and inductance are connected in parallel as loads between the EUT and the AC power source. Other sources of load, such as electronic loads, may be used if it can be shown that the source does not cause results that are different than would be obtained with passive resistors, inductors, and capacitors.		P
	All AC loads are rated for and adjustable to all test conditions. The equations for Qf are based upon an ideal parallel RLC circuit. For this reason, non-inductive resistors, low loss (high Qf) inductors, and capacitors with low effective series resistance and effective series inductance are utilized in the test circuit. Iron core inductors, if used, are not exceed a current THD of 2 % when operated at nominal voltage. Load components are conservatively rated for the voltage and power levels expected. Resistor power ratings are chosen so as to minimize thermally-induced drift in esistance values during the course of the test.		P
	Active and reactive power is calculated (using the measurements provided in Table 1) in each of the R, L and C legs of the load so that these parasitic parameters (and parasitics introduced by variacs or autotransformers) are properly accounted for when calculating Qf.		P

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

6	**Test for single or multi-phase inverter**		
6.1	**Test procedure**	**(see appended table)**	**P**
	The test uses an RLC load, resonant at the EUT nominal frequency (50 Hz or 60 Hz) and matched to the EUT output power.		P
	For multi-phase EUT, the load is balanced across all phases and the switch S1 as in Figure 1 opens all phases		P
	This test is performed with the EUT conditions as in Table 5, where power and voltage values are given as a percent of EUT full output rating.		P
	a)..Determine EUT test output power		P
	b) .Adjusting the DC input source		P
	c) .Turn off the EUT and open S1		P
	d) .Adjust the RLC circuit to have Qf = 1.0 ±0.05		P
	e)..Connect the RLC load configured in step d) to the EUT by closing S2		P
	f) ..Open the utility-disconnect switch S1 to initiate the test, Run-on time is recorded.		P
	g) .For test condition A, adjust the real load and only one of the reactive load components to each of the load imbalance conditions shown in the shaded portion of table 6. If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.		P
	h) For test condition B and C, adjust the only one reactive load components by approximately 1,0% per test, within a total range of 95% to 105% of the operating point. If run-on times are still increasing at the 95% or 105% points, additional 1% increments have to be taken until run-on times begin decreasing.		P
6.2	**Pass/fail criteria**		
	An EUT is considered to comply with the requirements for islanding protection when each case of recorded run-on time is less than 2 s or meets the requirements of local codes.		P
7	**Documentation**		
	At a minimum, the following information is recorded and maintained in the test report.		P
	a) Specifications of EUT. Table 8 provides an example of the type of information that is provided.		P

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	b) Measurement results. Table 9 provides an example of the type of information that is provided. Actual measured values is to be recorded.		P
	c) Block diagram of test circuit.		P
	d) Specifications of the test and measurement equipment. Table 10 provides an example of the type of information that is provided.		P
	e) Any test configuration or procedure details such as methods of achieving specified load and EUT output conditions.		P
	f) Any additional information required by the testing laboratory's accreditation.		P
	g) Specify the evaluation criterion from clause 6.2 that was utilized to determine if the product passed or failed the test.		P
Annex A	Islanding as it applies to PV systems(Informative)		--
A.1	General		--
A.2	Impact of distortion on islanding		--
Annex B	Test for independent islanding detection device (relay)(Informative)		--
B.1	Introduction		--
B.2	Testing circuit		--
B.3	Testing equipment		--
B.4	Testing procedure		--
B.5	Documentation		--

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

6	TABLE: tested condition and run-on time	P

Model: Tested on model MAX 75KTL3-XL2 with frequency 50Hz

No.	P_{EUT} (% of EUT rating)	Reactive load (% of normal)	P_{AC}	Q_{AC}	Run-on time(ms)	P_{EUT} (KW)	Actual Q_f (Var)	V_{DC} （V）	Which load is selected to be adjusted (R or L)
Test condition A									
1	100	100	0	0	459.5	75.11	1.00	800	/
2	100	100	-5	-5	332.5	75.11	0.98	800	/
3	100	100	-5	0	279.5	75.11	0.95	800	/
4	100	100	-5	+5	305.0	75.11	0.93	800	/
5	100	100	0	-5	401.0	75.11	1.03	800	/
6	100	100	0	+5	311.5	75.11	0.98	800	/
7	100	100	+5	-5	258.5	75.11	1.08	800	/
8	100	100	+5	0	279.5	75.11	1.06	800	/
9	100	100	+5	+5	157.5	75.11	1.03	800	/
Test condition B									
10	66	66	0	0	299.5	49.68	1.00	520	/
11	66	66	0	-5	196.0	49.68	1.03	520	L
12	66	66	0	-4	292.0	49.68	1.02	520	L
13	66	66	0	-3	287.5	49.68	1.02	520	L
14	66	66	0	-2	243.5	49.68	1.01	520	L
15	66	66	0	-1	242.0	49.68	1.01	520	L
16	66	66	0	1	308.0	49.68	0.99	520	L
17	66	66	0	2	464.0	49.68	0.99	520	L
18	66	66	0	3	415.5	49.68	0.98	520	L
19	66	66	0	4	409.5	49.68	0.98	520	L
20	66	66	0	5	311.5	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	838.0	24.81	1.00	309	/
22	33	33	0	-5	529.0	24.81	1.03	309	L
23	33	33	0	-4	668.0	24.81	1.02	309	L
24	33	33	0	-3	832.0	24.81	1.02	309	L
25	33	33	0	-2	652.0	24.81	1.01	309	L
26	33	33	0	-1	770.0	24.81	1.01	309	L
27	33	33	0	1	716.0	24.81	0.99	309	L
28	33	33	0	2	600.0	24.81	0.99	309	L
29	33	33	0	3	858.0	24.81	0.98	309	L
30	33	33	0	4	612.0	24.81	0.98	309	L
31	33	33	0	5	460.0	24.81	0.97	309	L

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

6	TABLE: tested condition and run-on time								P
Model: Tested on model MAX 75KTL3-XL2 with frequency 60Hz									
No.	**P_{EUT} (% of EUT rating)**	**Reactive load (% of normal)**	**P_{AC}**	**Q_{AC}**	**Run-on time(ms)**	**P_{EUT} (KW)**	**Actual Q_f (Var)**	**V_{DC} （V）**	**Which load is selected to be adjusted (R or L)**
Test condition A									
1	100	100	0	0	730.0	75.11	1.00	800	/
2	100	100	-5	-5	330.0	75.11	0.97	800	/
3	100	100	-5	0	484.0	75.11	0.95	800	/
4	100	100	-5	+5	414.0	75.11	0.93	800	/
5	100	100	0	-5	322.0	75.11	1.03	800	/
6	100	100	0	+5	256.0	75.11	0.98	800	/
7	100	100	+5	-5	260.0	75.11	1.08	800	/
8	100	100	+5	0	648.0	75.11	1.06	800	/
9	100	100	+5	+5	588.0	75.11	1.04	800	/
Test condition B									
10	66	66	0	0	335.5	49.68	1.00	520	/
11	66	66	0	-5	259.0	49.68	1.03	520	L
12	66	66	0	-4	327.0	49.68	1.02	520	L
13	66	66	0	-3	373.5	49.68	1.02	520	L
14	66	66	0	-2	327.5	49.68	1.01	520	L
15	66	66	0	-1	285.5	49.68	1.01	520	L
16	66	66	0	1	313.0	49.68	0.99	520	L
17	66	66	0	2	629.0	49.68	0.99	520	L
18	66	66	0	3	327.0	49.68	0.98	520	L
19	66	66	0	4	411.0	49.68	0.98	520	L
20	66	66	0	5	299.0	49.68	0.97	520	L
Test condition C									
21	33	33	0	0	530.0	24.81	1.00	309	/
22	33	33	0	-5	134.5	24.81	1.03	309	L
23	33	33	0	-4	192.5	24.81	1.02	309	L
24	33	33	0	-3	178.5	24.81	1.02	309	L
25	33	33	0	-2	226.5	24.81	1.01	309	L
26	33	33	0	-1	234.5	24.81	1.01	309	L
27	33	33	0	1	235.5	24.81	0.99	309	L
28	33	33	0	2	153.5	24.81	0.99	309	L
29	33	33	0	3	182.5	24.81	0.98	309	L
30	33	33	0	4	176.5	24.81	0.98	309	L
31	33	33	0	5	175.5	24.81	0.97	309	L

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

--- End of test report---