


# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

<b>Holder of Certificate:</b>	<b>INVT Solar Technology (ShenZhen) Co., Ltd.</b> 6th Floor, Block A INVT Guangming Technology Building Kejie Fourth Road, Shutianpu Community, Matian Guangming District 518000 Shenzhen PEOPLE'S REPUBLIC OF CHINA
<b>Product:</b>	<b>Converter (Solar Inverter)</b>
<b>Model(s):</b>	iMars XG3KTR, iMars XG4KTR, iMars XG5KTR, iMars XG6KTR, iMars XG8KTR, iMars XG9KTR, iMars XG10KTR, iMars XG11KTR, iMars XG12KTR, iMars XG15KTR1 iMars XG3KTR-S, iMars XG4KTR-S, iMars XG5KTR-S, iMars XG6KTR-S, iMars XG8KTR-S, iMars XG9KTR-S, iMars XG10KTR-S, iMars XG11KTR-S, iMars XG12KTR-S, iMars XG15KTR1-S iMars XG3KTR-AU, iMars XG4KTR-AU, iMars XG5KTR-AU, iMars XG6KTR-AU, iMars XG8KTR-AU, iMars XG9KTR-AU, iMars XG10KTR-AU, iMars XG11KTR-AU, iMars XG12KTR-AU, iMars XG15KTR1-AU
<b>Parameters:</b>	See page 2-4
<b>Applicable standards:</b>	VDE-AR-N 4105:2018 DIN VDE V 0124-100 (VDE V 0124-100):2020
<b>Test report no.:</b>	64290223040101

This Certificate of Conformity confirms the compliance with the above listed standards on a voluntary basis. It refers only to the sample submitted to TÜV SÜD Product Service GmbH and does not certify the quality or safety of the serial products. It was issued according to TÜV SÜD Product Service certification program Photovoltaics and Grid Integration. For details see: [www.tuvsud.com/ps-cert](http://www.tuvsud.com/ps-cert)

**Date,** 2022-11-22



( Billy Qiu )

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

## Parameters:

Model:	iMars XG3KTR	iMars XG4KTR	iMars XG5KTR	iMars XG6KTR	iMars XG8KTR
PV input terminal parameters:					
Maximum input voltage	1100 Vd.c.				
PV input operating voltage range	180-1000 Vd.c.				
MPPT voltage range(Full load)	250-850 Vd.c.				250-850 Vd.c.
Maximum number of input string per tracker	1/1				
Maximum operating PV input current	14/14 Ad.c.				
Maximum PV short circuit current	18/18 Ad.c.				
AC output rating					
Rated output voltage	3/N/PE~, 230/400 Va.c.				
Rated output frequency	50 Hz				
Maximum continuous output current	4.8 Aa.c.	6.4 Aa.c.	8.0 Aa.c.	9.6 Aa.c.	12.8 Aa.c.
Rated output active power	3.0 kW	4.0 kW	5.0 kW	6.0 kW	8.0 kW
Maximum output active power P <sub>E<sub>max</sub></sub>	3.0 kW	4.0 kW	5.0 kW	6.0 kW	8.0 kW
Maximum continuous output apparent power S <sub>E<sub>max</sub></sub>	3.3 kVA	4.4 kVA	5.5 kVA	6.6 kVA	8.8 kVA
Power factor	0.8 leading ~ 0.8 lagging				

Model:	iMars XG9KTR	iMars XG10KTR	iMars XG11KTR	iMars XG12KTR	iMars XG15KTR1
PV input terminal parameters:					
Maximum input voltage	1100 Vd.c.				
PV input operating voltage range	180-1000 Vd.c.				
MPPT voltage range(Full load)	400-850 Vd.c.	450-850 Vd.c.		480-850 Vd.c.	500-850 Vd.c.
Maximum number of input string per tracker	1/1				1/2
Maximum operating PV input current	14/14 Ad.c.				14/28 Ad.c.
Maximum PV short circuit current	18/18 Ad.c.				18/36 Ad.c.
AC output rating					
Rated output voltage	3/N/PE~, 230/400 Va.c.				
Rated output frequency	50 Hz				
Maximum continuous output current	14.4 Aa.c.	15.9 Aa.c.	17.5 Aa.c.	19.1 Aa.c.	23.9 Aa.c.
Rated output active power	9.0 kW	10.0 kW	11.0 kW	12.0 kW	15.0 kW
Maximum output active power P <sub>E<sub>max</sub></sub>	9.0 kW	10.0 kW	11.0 kW	12.0 kW	15.0 kW
Maximum continuous output apparent power S <sub>E<sub>max</sub></sub>	9.9 kVA	11 kVA	12.1 kVA	13.2 kVA	16.5 kVA
Power factor	0.8 leading ~ 0.8 lagging				

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

Model:	iMars XG3KTR-S	iMars XG4KTR-S	iMars XG5KTR-S	iMars XG6KTR-S	iMars XG8KTR-S
PV input terminal parameters:					
Maximum input voltage	1100 Vd.c.				
PV input operating voltage range	180-1000 Vd.c.				
MPPT voltage range(Full load)	200-850 Vd.c.				360-850 Vd.c.
Maximum number of input string per tracker	1/1				
Maximum operating PV input current	18/18 Ad.c.				
Maximum PV short circuit current	25/25 Ad.c.				
AC output rating					
Rated output voltage	3/N/PE~, 230/400 Va.c..				
Rated output frequency	50 Hz				
Maximum continuous output current	4.8 Aa.c.	6.4 Aa.c.	8.0 Aa.c.	9.6 Aa.c.	12.8 Aa.c.
Rated output active power	3.0 kW	4.0 kW	5.0 kW	6.0 kW	8.0 kW
Maximum output active power $P_{E_{max}}$	3.0 kW	4.0 kW	5.0 kW	6.0 kW	8.0 kW
Maximum output apparent power $S_{E_{max}}$	3.3 kVA	4.4 kVA	5.5 kVA	6.6 kVA	8.8 kVA
Power factor	0.8 leading ~ 0.8 lagging				

Model:	iMars XG9KTR- S	iMars XG10KTR- S	iMars XG11KTR- S	iMars XG12KTR- S	iMars XG15KTR1- S
PV input terminal parameters:					
Maximum input voltage	1100 Vd.c.				
PV input operating voltage range	180-1000 Vd.c.				
MPPT voltage range(Full load)	360-850 Vd.c.		380-850 Vd.c.		450-850 Vd.c.
Maximum number of input string per tracker	1/1				
Maximum operating PV input current	18/18 Ad.c.				
Maximum PV short circuit current	25/25 Ad.c.				
AC output rating					
Rated output voltage	3/N/PE~, 230/400 Va.c.				
Rated output frequency	50 Hz				
Maximum continuous output current	14.4 Aa.c.	15.9 Aa.c.	17.5 Aa.c.	19.1 Aa.c.	23.9 Aa.c.
Rated output active power	9.0 kW	10.0 kW	11.0 kW	12.0 kW	15.0 kW
Maximum output active power $P_{E_{max}}$	9.0 kW	10.0 kW	11.0 kW	12.0 kW	15.0 kW
Maximum output apparent power $S_{E_{max}}$	9.9 kVA	11 kVA	12.1 kVA	13.2 kVA	16.5 kVA
Power factor	0.8 leading ~ 0.8 lagging				

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

Model:	iMars XG3KTR- AU	iMars XG4KTR- AU	iMars XG5KTR- AU	iMars XG6KTR- AU	iMars XG8KTR- AU
PV input terminal parameters:					
Maximum input voltage	1100 Vd.c.				
PV input operating voltage range	180-1000 Vd.c.				
MPPT voltage range(Full load)	250-850 Vd.c.				320-850 Vd.c.
Maximum number of input string per tracker	1/1				1/2
Maximum operating PV input current	14/14 Ad.c.				14/28 Ad.c.
Maximum PV short circuit current	18/18 Ad.c.				18/36 Ad.c.
AC output rating					
Rated output voltage	3/N/PE,230/400 Va.c.				
Rated output frequency	50 Hz				
Maximum continuous output current	4.3 Aa.c.	5.8 Aa.c.	7.2 Aa.c.	8.7 Aa.c.	11.6 Aa.c.
Rated output active power	3.0 kW	4.0 kW	5.0 kW	6.0 kW	8.0 kW
Maximum output active power $P_{E_{max}}$	3.0 kW	4.0 kW	5.0 kW	6.0 kW	8.0 kW
Maximum output apparent power $S_{E_{max}}$	3.0 kVA	4.0 kVA	5.0 kVA	6.0 kVA	8.0 kVA
Power factor	0.8 leading ~ 0.8 lagging				

Model:	iMars XG9KTR- AU	iMars XG10KTR- AU	iMars XG11KTR- AU	iMars XG12KTR- AU	iMars XG15KTR1- AU
PV input terminal parameters:					
Maximum input voltage	1100 Vd.c.				
PV input operating voltage range	180-1000 Vd.c.				
MPPT voltage range(Full load)	400-850 Vd.c.	450-850 Vd.c.		480-850 Vd.c.	500-850 Vd.c.
Maximum number of input string per tracker	1/2				
Maximum operating PV input current	14/28 Ad.c.				
Maximum PV short circuit current	18/36 Ad.c.				
AC output rating					
Rated output voltage	3/N/PE,230/400 Va.c.				
Rated output frequency	50 Hz				
Maximum continuous output current	13.0 Aa.c.	14.5 Aa.c.	16.0 Aa.c.	17.4 Aa.c.	21.7 Aa.c.
Rated output active power	9.0 kW	10.0 kW	11.0 kW	12.0 kW	15.0 kW
Maximum output active power $P_{E_{max}}$	9.0 kW	10.0 kW	11.0 kW	12.0 kW	15.0 kW
Maximum output apparent power $S_{E_{max}}$	9.0 kVA	10.0 kVA	11.0 kVA	12.0 kVA	15.0 kVA
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# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

## E.4 Unit certificate

Unit Certificate		
<b>Manufacturer</b>	INVT Solar Technology (ShenZhen) Co., Ltd.	
<b>Power generation unit type</b>	<p>[Inverter]:</p> <p>iMars XG3KTR, iMars XG4KTR, iMars XG5KTR, iMars XG6KTR, iMars XG8KTR, iMars XG9KTR, iMars XG10KTR, iMars XG11KTR, iMars XG12KTR, iMars XG15KTR1</p> <p>iMars XG3KTR-S, iMars XG4KTR-S, iMars XG5KTR-S, iMars XG6KTR-S, iMars XG8KTR-S, iMars XG9KTR-S, iMars XG10KTR-S, iMars XG11KTR-S, iMars XG12KTR-S, iMars XG15KTR1-S</p> <p>iMars XG3KTR-AU, iMars XG4KTR-AU, iMars XG5KTR-AU, iMars XG6KTR-AU, iMars XG8KTR-AU, iMars XG9KTR-AU, iMars XG10KTR-AU, iMars XG11KTR-AU, iMars XG12KTR-AU, iMars XG15KTR1-AU</p> <p>Remark: certified on representative model iMars XG15KTR1-Sof family design products, results of the measurement of iMars XG15KTR1-Scan be transferred to other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020.</p>	
<b>Assessment values</b>	max. active power $P_{E_{max}}$	<u>15000 W (iMars XG15KTR1-S)</u>
	max. apparent power $S_{E_{max}}$	<u>16500 VA (iMars XG15KTR1-S)</u>
	Rated voltage	<u>3/N/PE~, 230/400 Va.c.</u>
	Rated current (AC) $I_r$	<u>21.7 A (iMars XG15KTR1-S)</u>
	Initial short-circuit AC current $I''_k$	<u>23.9 A (iMars XG15KTR1-S)</u>
<b>Network connection rule</b>	<p><b>VDE-AR-N 4105 “Generators connected to the low-voltage distribution network”</b></p> <p>Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network</p>	
<b>Test requirement</b>	<p><b>DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage”</b></p> <p>Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network</p>	
<b>Test report</b>	<u>64.290.22.30401.01 from 2022-11-14</u>	
The above designated power generation unit meets the requirements of VDE-AR-N 4105		

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

## E.5 Test report "Network interactions" for power generation units with an input current > 75 A

<b>Extract of the test report for power generation units</b> <b>"Determination of electrical properties"</b>		No. 64.290.22.30401.01
System manufacturer:	INVT Solar Technology (ShenZhen) Co., Ltd.  6th Floor, Block A INVT Guangming Technology Building Kejie Fourth Road, Shutianpu Community, Matian Guangming District 518000 Shenzhen PEOPLE'S REPUBLIC OF CHINA	
Manufacturer indications:	Type of system	Manufacturer indications:
	Max. active power $P_{E_{max}}$	<u>3000 W (iMars XG3KTR, iMars XG3KTR-S, iMars XG3KTR-AU)</u>  <u>4000 W (iMars XG4KTR, iMars XG4KTR-S, iMars XG4KTR-AU)</u>  <u>5000 W (iMars XG5KTR, iMars XG5KTR-S, iMars XG5KTR-AU)</u>  <u>6000 W (iMars XG6KTR, iMars XG6KTR-S, iMars XG6KTR-AU)</u>  <u>8000 W (iMars XG8KTR, iMars XG8KTR-S, iMars XG8KTR-AU)</u>  <u>9000 W (iMars XG9KTR, iMars XG9KTR-S, iMars XG9KTR-AU)</u>  <u>10000 W (iMars XG10KTR, iMars XG10KTR-S, iMars XG10KTR-AU)</u>  <u>11000 W (iMars XG11KTR, iMars XG11KTR-S, iMars XG11KTR-AU)</u>  <u>12000 W (iMars XG12KTR, iMars XG12KTR-S, iMars XG12KTR-AU)</u>  <u>15000 W (iMars XG15KTR1, iMars XG15KTR1-S, iMars XG15KTR1-AU)</u>
	Rated voltage	<u>3/N/PE~, 230/400 Va.c.</u>
Measurement period:	From 2022-06-15 to 2022-11-10	

# Certificate of Conformity

No. **ESY 093811 0081 Rev. 00**

Rapid voltage change –DIN EN 61000-3-3(iMars XG3KTR-S)	
Connection without provisions (regarding the primary energy carrier)	$K_f=0.94$
Most adverse case when switching between generator levels	$K_f=0.59$
Connection at nominal conditions (of the primary energy carrier)	$K_f=0.97$
Disconnection at rated power	$K_f=1.04$
Worst value of all switching operations	$k_{imax}=1.04$

Rapid voltage change –DIN EN 61000-3-3(iMars XG9KTR-S)	
Connection without provisions (regarding the primary energy carrier)	$K_f=0.54$
Most adverse case when switching between generator levels	$K_f=0.51$
Connection at nominal conditions (of the primary energy carrier)	$K_f=0.59$
Disconnection at rated power	$K_f=1.03$
Worst value of all switching operations	$k_{imax}=1.03$

Rapid voltage change –DIN EN 61000-3-11(iMars XG15KTR1-S)	
Connection without provisions (regarding the primary energy carrier)	$K_f=0.37$
Most adverse case when switching between generator levels	$K_f=0.51$
Connection at nominal conditions (of the primary energy carrier)	$K_f=0.37$
Disconnection at rated power	$K_f=1.01$
Worst value of all switching operations	$k_{imax}=1.01$

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

Flicker-DIN EN 61000-3-3(iMars XG3KTR-S)					
Test items	$d_{(t) - 500ms}$ [%]	$d_c$ [%]	$d_{max}$ [%]	$P_{st}$	$P_{lt}$
Limit value	3.30	3.30	4.00	1.00	0.65
L1	0	0	0.22	0.59	0.55
L2	0	0	0.23	0.61	0.55
L3	0	0	0.23	0.57	0.52

Flicker-DIN EN 61000-3-3(iMars XG9KTR-S)					
Test items	$d_{(t) - 500ms}$ [%]	$d_c$ [%]	$d_{max}$ [%]	$P_{st}$	$P_{lt}$
Limit value	3.30	3.30	4.00	1.00	0.65
L1	0	0	0.22	0.57	0.54
L2	0	0	0.23	0.57	0.55
L3	0	0	0.23	0.54	0.51

Flicker-DIN EN 61000-3-11(iMars XG15KTR1-S)					
Test items	$d_{(t) - 500ms}$ [%]	$d_c$ [%]	$d_{max}$ [%]	$P_{st}$	$P_{lt}$
Limit value	3.30	3.30	4.00	1.00	0.65
L1	0	0	0.45	0.68	0.61
L2	0	0	0.46	0.67	0.62
L3	0	0	0.46	0.62	0.58

Harmonics-DIN EN 61000-3-12(>16 A and ≤75 A) (iMars XG15KTR1-S)														
Description	Permissible individual harmonic current $I_h/I_{ref}$ %												Permissible harmonics Parameter (%)	
	$I_2$	$I_3$	$I_4$	$I_5$	$I_6$	$I_7$	$I_8$	$I_9$	$I_{10}$	$I_{11}$	$I_{12}$	$I_{13}$	THC/ $I_{ref}$	PWHC/ $I_{ref}$
Limit value	8,0	-	4,0	10,7	2,67	7,2	2,0	-	1,6	3,1	1,33	2,0	13	22
Actual value	0.56 0	0.23 0	0.74 0	0.96 0	0.09 0	0.90 0	0.11 0	0.07 0	0.12 0	0.32 0	0.06 0	0.35 0	1.92	0.60

Note: The harmonic values are maximum values from all phases.



# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

Harmonics-DIN EN 61000-3-2(≤16 A) (iMars XG3KTR-S)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	A	A	A	A	A	A	A	A	A	A	A	A
2	0.008	0.406	0.413	0.396	0.474	0.496	0.639	0.861	0.477	0.631	0.474	1.08
3	0.005	0.048	0.083	0.081	0.130	0.159	0.244	0.214	0.193	0.168	0.184	2.30
4	0.005	0.057	0.077	0.084	0.098	0.102	0.158	0.251	0.103	0.135	0.113	0.43
5	0.005	0.629	0.508	0.477	0.437	0.511	0.564	0.705	0.836	0.877	0.988	1.14
6	0.005	0.059	0.063	0.062	0.063	0.071	0.082	0.059	0.056	0.091	0.061	0.30
7	0.005	0.583	0.462	0.351	0.163	0.145	0.199	0.298	0.411	0.572	0.614	0.77
8	0.005	0.041	0.046	0.042	0.048	0.049	0.059	0.060	0.046	0.057	0.044	0.23
9	0.005	0.020	0.032	0.027	0.038	0.039	0.053	0.050	0.058	0.055	0.061	0.40
10	0.005	0.033	0.037	0.035	0.041	0.044	0.062	0.077	0.038	0.054	0.041	0.18
11	0.005	0.040	0.096	0.231	0.227	0.225	0.170	0.181	0.257	0.286	0.316	0.33
12	0.005	0.029	0.034	0.034	0.035	0.037	0.071	0.085	0.049	0.043	0.057	0.15
13	0.005	0.170	0.112	0.057	0.148	0.200	0.198	0.196	0.193	0.195	0.201	0.21
14	0.006	0.028	0.033	0.030	0.029	0.034	0.047	0.078	0.038	0.040	0.039	0.13
15	0.005	0.025	0.030	0.027	0.025	0.023	0.032	0.034	0.024	0.029	0.029	0.15
16	0.006	0.043	0.036	0.032	0.029	0.033	0.058	0.081	0.028	0.041	0.027	0.12
17	0.005	0.100	0.098	0.107	0.061	0.123	0.118	0.113	0.123	0.123	0.129	0.13
18	0.017	0.036	0.039	0.032	0.037	0.035	0.059	0.075	0.037	0.041	0.038	0.10
19	0.005	0.119	0.117	0.085	0.038	0.078	0.117	0.115	0.109	0.100	0.102	0.12
20	0.011	0.029	0.030	0.031	0.041	0.030	0.058	0.085	0.044	0.033	0.042	0.09
21	0.005	0.018	0.026	0.028	0.034	0.027	0.037	0.051	0.036	0.028	0.039	0.11
22	0.009	0.024	0.031	0.034	0.041	0.033	0.047	0.071	0.036	0.040	0.032	0.08
23	0.006	0.032	0.055	0.092	0.063	0.051	0.093	0.091	0.091	0.098	0.095	0.10
24	0.058	0.062	0.061	0.065	0.068	0.066	0.072	0.078	0.060	0.070	0.060	0.08
25	0.006	0.059	0.044	0.044	0.047	0.037	0.053	0.088	0.086	0.081	0.080	0.09
26	0.012	0.027	0.024	0.025	0.030	0.027	0.042	0.065	0.034	0.033	0.035	0.07
27	0.006	0.028	0.021	0.022	0.027	0.025	0.029	0.035	0.027	0.031	0.031	0.08
28	0.009	0.033	0.027	0.025	0.034	0.027	0.045	0.070	0.031	0.037	0.036	0.07
29	0.006	0.035	0.078	0.062	0.027	0.033	0.054	0.075	0.078	0.075	0.076	0.08
30	0.018	0.033	0.037	0.035	0.033	0.032	0.048	0.058	0.033	0.041	0.044	0.06
31	0.006	0.008	0.008	0.037	0.069	0.067	0.068	0.065	0.068	0.065	0.068	0.07
32	0.006	0.023	0.022	0.022	0.025	0.022	0.033	0.047	0.033	0.029	0.039	0.06
33	0.009	0.021	0.024	0.024	0.025	0.021	0.044	0.040	0.028	0.030	0.031	0.07
34	0.005	0.031	0.023	0.027	0.030	0.030	0.033	0.040	0.028	0.035	0.031	0.05
35	0.011	0.023	0.034	0.043	0.056	0.056	0.053	0.056	0.058	0.057	0.057	0.06
36	0.005	0.021	0.017	0.017	0.030	0.030	0.035	0.046	0.026	0.034	0.035	0.05
37	0.006	0.058	0.055	0.053	0.053	0.050	0.058	0.054	0.053	0.058	0.058	0.06
38	0.005	0.018	0.018	0.018	0.021	0.024	0.039	0.046	0.044	0.030	0.050	0.05
39	0.005	0.022	0.024	0.024	0.023	0.029	0.050	0.049	0.036	0.031	0.034	0.06
40	0.005	0.029	0.024	0.023	0.023	0.023	0.037	0.044	0.040	0.032	0.044	0.05
THD	0.07	1.04	0.88	0.83	0.79	0.89	1.05	1.34	1.27	1.41	1.47	5%

Note:  $I_{ref} = 4.35 \text{ A}$   
 The harmonic values are maximum values from all phases.

# Certificate of Conformity

No. **ESY 093811 0081 Rev. 00**

Harmonics-DIN EN 61000-3-2(≤16 A) (iMars XG9KTR-S)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	A	A	A	A	A	A	A	A	A	A	A	A
2	0.001	0.329	0.392	0.442	0.512	0.399	0.562	0.557	0.683	0.609	0.639	1.08
3	0.001	0.287	0.387	0.349	0.246	0.340	0.281	0.284	0.297	0.293	0.307	2.30
4	0.001	0.192	0.213	0.243	0.228	0.323	0.223	0.224	0.237	0.212	0.218	0.43
5	0.002	0.827	0.787	0.707	0.642	0.656	0.661	0.723	0.832	0.805	0.871	1.14
6	0.001	0.077	0.056	0.055	0.046	0.053	0.068	0.068	0.083	0.083	0.088	0.30
7	0.002	0.403	0.512	0.456	0.394	0.390	0.334	0.328	0.298	0.172	0.183	0.77
8	0.001	0.029	0.040	0.041	0.038	0.039	0.041	0.038	0.034	0.029	0.029	0.23
9	0.001	0.028	0.024	0.017	0.028	0.023	0.033	0.031	0.030	0.026	0.025	0.40
10	0.001	0.021	0.022	0.020	0.022	0.029	0.035	0.033	0.037	0.034	0.035	0.18
11	0.001	0.121	0.029	0.036	0.049	0.088	0.064	0.085	0.097	0.098	0.106	0.33
12	0.001	0.013	0.015	0.012	0.018	0.017	0.014	0.014	0.020	0.019	0.019	0.15
13	0.001	0.084	0.068	0.050	0.021	0.021	0.044	0.067	0.080	0.081	0.085	0.21
14	0.001	0.009	0.012	0.010	0.011	0.012	0.014	0.013	0.015	0.013	0.015	0.13
15	0.001	0.008	0.011	0.009	0.010	0.010	0.013	0.012	0.014	0.013	0.012	0.15
16	0.001	0.007	0.010	0.009	0.011	0.011	0.010	0.010	0.014	0.013	0.013	0.12
17	0.000	0.020	0.044	0.044	0.022	0.020	0.018	0.018	0.028	0.033	0.043	0.13
18	0.001	0.007	0.009	0.007	0.012	0.007	0.009	0.008	0.009	0.008	0.008	0.10
19	0.000	0.007	0.024	0.025	0.015	0.009	0.010	0.014	0.019	0.021	0.024	0.12
20	0.001	0.006	0.007	0.006	0.008	0.006	0.007	0.007	0.009	0.007	0.007	0.09
21	0.000	0.005	0.006	0.005	0.008	0.006	0.006	0.006	0.008	0.007	0.008	0.11
22	0.001	0.005	0.006	0.004	0.007	0.005	0.006	0.006	0.007	0.007	0.006	0.08
23	0.000	0.019	0.007	0.007	0.010	0.016	0.013	0.007	0.007	0.009	0.013	0.10
24	0.001	0.005	0.005	0.004	0.006	0.005	0.007	0.006	0.005	0.005	0.004	0.08
25	0.000	0.017	0.006	0.006	0.009	0.010	0.008	0.006	0.006	0.006	0.010	0.09
26	0.000	0.003	0.005	0.004	0.005	0.003	0.005	0.004	0.006	0.005	0.004	0.07
27	0.000	0.004	0.005	0.004	0.005	0.003	0.005	0.004	0.005	0.004	0.004	0.08
28	0.000	0.003	0.005	0.003	0.005	0.004	0.005	0.005	0.005	0.004	0.004	0.07
29	0.000	0.006	0.011	0.010	0.009	0.009	0.005	0.005	0.007	0.005	0.007	0.08
30	0.000	0.004	0.005	0.003	0.005	0.004	0.005	0.004	0.004	0.004	0.003	0.06
31	0.000	0.003	0.007	0.007	0.007	0.005	0.004	0.007	0.009	0.008	0.007	0.07
32	0.000	0.003	0.004	0.003	0.004	0.003	0.004	0.004	0.004	0.004	0.004	0.06
33	0.000	0.003	0.004	0.003	0.004	0.003	0.004	0.003	0.004	0.003	0.003	0.07
34	0.000	0.002	0.004	0.002	0.004	0.003	0.004	0.003	0.004	0.003	0.003	0.05
35	0.000	0.006	0.004	0.004	0.006	0.006	0.009	0.011	0.011	0.010	0.008	0.06
36	0.000	0.002	0.003	0.002	0.004	0.002	0.004	0.003	0.004	0.003	0.003	0.05
37	0.000	0.004	0.006	0.005	0.006	0.008	0.011	0.014	0.014	0.012	0.011	0.06
38	0.000	0.002	0.003	0.002	0.003	0.002	0.004	0.004	0.004	0.004	0.003	0.05
39	0.000	0.002	0.003	0.002	0.003	0.003	0.004	0.004	0.005	0.004	0.003	0.06
40	0.000	0.002	0.003	0.002	0.003	0.002	0.003	0.003	0.004	0.003	0.003	0.05
THD	0.00	1.05	1.12	1.05	0.98	0.99	1.00	1.05	1.19	1.10	1.17	5%

Note:  $I_{ref} = 13.04 A$   
The harmonic values are maximum values from all phases.

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

Harmonics-DIN EN 61000-3-12(>16 A and ≤75 A) (iMars XG15KTR1-S)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	[%]
2	0.010	0.280	0.270	0.300	0.370	0.420	0.450	0.530	0.520	0.560	1.120	8.0
3	0.010	0.130	0.100	0.110	0.110	0.110	0.120	0.120	0.120	0.130	0.230	-
4	0.010	0.190	0.260	0.340	0.420	0.480	0.560	0.640	0.680	0.740	0.650	4.0
5	0.010	0.880	0.330	0.310	0.460	0.560	0.680	0.780	0.870	0.960	0.920	10.7
6	0.010	0.040	0.040	0.050	0.060	0.060	0.070	0.070	0.080	0.090	0.080	2.67
7	0.010	0.900	0.410	0.170	0.100	0.190	0.300	0.400	0.470	0.560	0.720	7.2
8	0.010	0.040	0.030	0.050	0.070	0.090	0.070	0.050	0.050	0.050	0.110	2.0
9	0.010	0.030	0.030	0.020	0.030	0.030	0.040	0.040	0.040	0.040	0.070	-
10	0.010	0.040	0.070	0.040	0.060	0.070	0.070	0.070	0.070	0.080	0.120	1.6
11	0.010	0.090	0.290	0.210	0.090	0.130	0.190	0.240	0.270	0.320	0.320	3.1
12	0.010	0.030	0.030	0.020	0.030	0.030	0.030	0.030	0.030	0.030	0.060	1.33
13	0.010	0.350	0.040	0.070	0.190	0.240	0.280	0.270	0.260	0.270	0.310	2.0
14	0.010	0.030	0.040	0.020	0.070	0.100	0.100	0.100	0.100	0.110	0.110	-
15	0.010	0.020	0.030	0.020	0.030	0.040	0.040	0.040	0.040	0.050	0.060	-
16	0.010	0.030	0.030	0.020	0.050	0.070	0.070	0.070	0.070	0.080	0.110	-
17	0.010	0.210	0.120	0.100	0.030	0.120	0.190	0.240	0.250	0.240	0.210	-
18	0.030	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.050	0.050	-
19	0.010	0.060	0.100	0.050	0.050	0.100	0.170	0.180	0.180	0.200	0.220	-
20	0.020	0.030	0.040	0.030	0.050	0.070	0.090	0.100	0.100	0.110	0.090	-
21	0.010	0.020	0.020	0.020	0.020	0.020	0.030	0.030	0.030	0.030	0.030	-
22	0.010	0.030	0.040	0.030	0.030	0.050	0.050	0.070	0.080	0.090	0.130	-
23	0.010	0.070	0.110	0.090	0.050	0.080	0.140	0.180	0.190	0.200	0.220	-
24	0.100	0.080	0.110	0.110	0.110	0.110	0.110	0.120	0.120	0.120	0.080	-
25	0.010	0.160	0.090	0.050	0.060	0.050	0.100	0.110	0.100	0.110	0.110	-
26	0.020	0.030	0.040	0.050	0.030	0.040	0.070	0.100	0.110	0.120	0.120	-
27	0.010	0.030	0.030	0.030	0.020	0.020	0.030	0.030	0.030	0.030	0.030	-
28	0.010	0.040	0.020	0.040	0.030	0.030	0.040	0.040	0.050	0.070	0.090	-
29	0.010	0.140	0.030	0.020	0.100	0.060	0.080	0.110	0.090	0.070	0.090	-
30	0.030	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.050	0.050	0.040	-
31	0.010	0.020	0.030	0.050	0.130	0.110	0.110	0.120	0.130	0.150	0.190	-
32	0.010	0.020	0.030	0.050	0.020	0.020	0.040	0.060	0.080	0.090	0.090	-
33	0.010	0.020	0.030	0.020	0.020	0.020	0.030	0.030	0.030	0.030	0.030	-
34	0.010	0.030	0.040	0.060	0.020	0.020	0.020	0.050	0.070	0.090	0.110	-
35	0.010	0.050	0.110	0.120	0.160	0.140	0.120	0.110	0.120	0.150	0.180	-
36	0.010	0.020	0.020	0.020	0.030	0.030	0.030	0.040	0.040	0.040	0.050	-
37	0.010	0.130	0.110	0.130	0.180	0.180	0.180	0.190	0.170	0.120	0.080	-
38	0.010	0.020	0.030	0.040	0.040	0.050	0.050	0.080	0.080	0.100	0.090	-
39	0.010	0.030	0.020	0.020	0.020	0.030	0.040	0.030	0.040	0.040	0.040	-
40	0.010	0.010	0.030	0.030	0.020	0.040	0.050	0.030	0.040	0.050	0.090	-
THC/I <sub>ref</sub>	0.12	1.41	0.79	0.70	0.86	1.01	1.19	1.38	1.48	1.620	1.92	13
PWHC/I <sub>ref</sub>	0.12	0.37	0.32	0.31	0.36	0.38	0.47	0.54	0.55	0.580	0.60	22

Note: I<sub>ref</sub> = 21.74 A  
 The harmonic values are maximum values from all phases.

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

## E.6 Certificate of the network and system protection

Certificate of NS protection	
<b>Manufacturer</b>	INVT Solar Technology (ShenZhen) Co., Ltd.
<b>Type of NS protection</b>	Integrated NS protection
<b>Central NS protection</b>	<input type="checkbox"/>
<b>Integrated NS protection</b>	<input checked="" type="checkbox"/> Assigned to power generation unit of type: <u>iMars XG3KTR, iMars XG3KTR-S, iMars XG3KTR-AU</u> <u>iMars XG4KTR, iMars XG4KTR-S, iMars XG4KTR-AU</u> <u>iMars XG5KTR, iMars XG5KTR-S, iMars XG5KTR-AU</u> <u>iMars XG6KTR, iMars XG6KTR-S, iMars XG6KTR-AU</u> <u>iMars XG8KTR, iMars XG8KTR-S, iMars XG8KTR-AU</u> <u>iMars XG9KTR, iMars XG9KTR-S, iMars XG9KTR-AU</u> <u>iMars XG10KTR, iMars XG10KTR-S, iMars XG10KTR-AU</u> <u>iMars XG11KTR, iMars XG11KTR-S, iMars XG11KTR-AU</u> <u>iMars XG12KTR, iMars XG12KTR-S, iMars XG12KTR-AU</u> <u>iMars XG15KTR1, iMars XG15KTR1-S, iMars XG15KTR1-AU</u>
<b>Network connection rule</b>	<b>VDE-AR-N 4105 “Generators connected to the low-voltage distribution network”</b> Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network
<b>Test requirement</b>	<b>DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage”</b> Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network
<b>Test report</b>	64.290.22.30401.01 from 2022-11-14
The network and system protection designated above meets the requirements of VDE-AR-N 4105.	

# Certificate of Conformity

No. ESY 093811 0081 Rev. 00

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

<b>Extract from test report for NS protection</b> "Determination of electrical properties"		No: 64.290.22.30401.01	
<b>NS protection test report</b>			
<b>Type of NS system:</b>	Integrated NS protection	<b>Other Manufacturer indications</b>	
<b>Software version:</b>	GAAA1.0		
<b>Manufacturer:</b>	INVT Solar Technology (ShenZhen) Co., Ltd.  6th Floor, Block A INVT Guangming Technology Building Kejie Fourth Road, Shutianpu Community, Matian Guangming District 518000 Shenzhen PEOPLE'S REPUBLIC OF CHINA		
<b>Measuring period:</b>	From 2022-06-15 to 2022-11-10		
	<b>Inverter</b>		
<b>Protection function</b>	<b>Setting value</b>	<b>Tripping value</b>	<b>Tripping time NS protection*</b>
Rise-in-voltage protection $U >>$	$1.25 * U_n$	L1-N/L2-N/L3-N: 288.2V/288.2V/288.2V; L1-N: 287.7 V; L2-N: 287.7 V; L3-N: 288.7 V;	L1-N/L2-N/L3-N: 134.4 ms; L1-N: 130.4 ms; L2-N: 137.4 ms; L3-N: 139.2 ms;
Rise-in-voltage protection $U >$	$1.10 * U_n$	$1.12 * U_n$	ms**
Voltage drop protection $U <$	$0.8 * U_n$	L1-N/L2-N/L3-N: 183.7V/183.7V/183.7V; L1-N: 183.7 V; L2-N: 184.4 V; L3-N: 184.6 V;	L1-N/L2-N/L3-N: 3055.0 ms; L1-N: 3053.8 ms; L2-N: 3051.2 ms; L3-N: 3060.4 ms;
Voltage drop protection $U <<$	$0.45 * U_n$	L1-N/L2-N/L3-N: 104.8V/104.8V/104.8V; L1-N: 102.1 V; L2-N: 103.0 V; L3-N: 101.2 V;	L1-N/L2-N/L3-N: 334.4 ms; L1-N: 340.5 ms; L2-N: 337.0 ms; L3-N: 340.5 ms;
Frequency decrease protection $f <$	47.5 Hz	47.49 Hz	196.5 ms
Frequency increase protection $f >$	51.5 Hz	51.50 Hz	151.0 ms

# Certificate of Conformity

No. **ESY 093811 0081 Rev. 00**

<p>*: The tripping time includes the period from the limit value violation <math>U/f</math> until the tripping signal to the interface switch.</p> <p>When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above.</p> <p>The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms.</p> <p>**: Verification disconnection time of moving 10-min-average value.</p> <p>Disconnecting time as below:                      540.8s (L1-N/L2-N/L3-N from 600s@<math>U_n</math> to 112%<math>U_n</math>)                      Continuous operation (L1-N from 600s@<math>U_n</math> to 108%<math>U_n</math>) / Continuous operation (L2-N from 600s@<math>U_n</math> to 108%<math>U_n</math>) / Continuous operation (L3-N from 600s@<math>U_n</math> to 108%<math>U_n</math>)                      360.7s (L1-N from 600s@106%<math>U_n</math> to 114%<math>U_n</math>) / 360.4s (L2-N from 600s@106%<math>U_n</math> to 114%<math>U_n</math>) / 360.3s (L3-N from 600s@106%<math>U_n</math> to 114%<math>U_n</math>)</p>	
<p><input checked="" type="checkbox"/> as integrated NS protection</p>	
<p>Assigned to power generation unit type</p>	<p> <a href="#">iMars XG3KTR</a>, <a href="#">iMars XG3KTR-S</a>,  <a href="#">iMars XG3KTR-AU</a>  <a href="#">iMars XG4KTR</a>, <a href="#">iMars XG4KTR-S</a>,  <a href="#">iMars XG4KTR-AU</a>  <a href="#">iMars XG5KTR</a>, <a href="#">iMars XG5KTR-S</a>,  <a href="#">iMars XG5KTR-AU</a>  <a href="#">iMars XG6KTR</a>, <a href="#">iMars XG6KTR-S</a>,  <a href="#">iMars XG6KTR-AU</a>  <a href="#">iMars XG8KTR</a>, <a href="#">iMars XG8KTR-S</a>,  <a href="#">iMars XG8KTR-AU</a>  <a href="#">iMars XG9KTR</a>, <a href="#">iMars XG9KTR-S</a>,  <a href="#">iMars XG9KTR-AU</a>  <a href="#">iMars XG10KTR</a>, <a href="#">iMars XG10KTR-S</a>,  <a href="#">iMars XG10KTR-AU</a>  <a href="#">iMars XG11KTR</a>, <a href="#">iMars XG11KTR-S</a>,  <a href="#">iMars XG11KTR-AU</a>  <a href="#">iMars XG12KTR</a>, <a href="#">iMars XG12KTR-S</a>,  <a href="#">iMars XG12KTR-AU</a>  <a href="#">iMars XG15KTR1</a>, <a href="#">iMars XG15KTR1-S</a>,  <a href="#">iMars XG15KTR1-AU</a> </p>
<p>Integrated interface switch type</p>	<p>Series-connected relays for all phase conductors each</p> <p>Relay type: HF167F-W</p>
<p>Response time of interface switch for integrated NS protection</p>	<p>Release time: Max. 10 ms (HF167F-W)</p>
<p>Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.</p>	<p><input checked="" type="checkbox"/></p>