SLK Grid PV-Inverter

Solar Energy Doesn't Get Any Better!
PCM Supports Total Solutions.

JD Auspice CO.,Ltd. ADD：2F.-5, No.7, Lane. 43, Shuangcheng St., Zhongshan Dist., Taipei City 104, Taiwan (R.O.C.) TEL：02-2595-9780 FAX：02-2595-9412

Input data

型號	SLK-1500	SLK-2000	SLK-3000	SLK-4000
設備外觀圖				
最大輸入功率	1750W	2340W	3510W	4700W
最大輸入電壓	500VDC	500VDC	500VDC	500VDC
最佳輸入電壓(DC)	360V~400V			
最大功率點追蹤範圍	150V to 500V ±5%			
最低起動電壓	100V ±5%			
工作電壓範圍	100±5% ~ 500-5%+0%V			
開始發電輸入電壓	150V±5%			
滿載輸出之輸入電壓範圍	200V to 500V	200V to 500V	200V to 500V	250V to 500V
關機電壓	80V typical			
最大輸入電流	7.5ADC	10ADC	15.2ADC	20ADC
輸入電壓之漣波比	< 10%			
輸入絕緣阻抗要求	>8M ohm			
直流輸入開關	ON/OFF 20A			
輸入插座-線材端	Tyco-contact (1 pair)			
直流輸入接頭	Tyco-contact (1 pair)-cable type			Tyco-contact (3 pair)

Output data

型號	SLK-1500	SLK-2000	SLK-3000	SLK-4000
輸出功率	1500W	2000W	**3000W**	4000W
最大輸出功率	1650W	2200W	**3300W**	4400W
輸出電壓範圍	190V, minimum 270V, maximum			
輸出電壓	230Vac			
輸出頻率範圍	50/60Hz（自動偵測）			
輸出電流	6.6A	8.7A	**13A**	17.4A
輸出電流諧波成份	THD<3%			
輸出功率因素	>0.99			
輸出電流直流成份	<0.5% of rated inverter output current			

General data

Model	SLK-1500	SLK-2000	SLK-3000	SLK-4000
內部功率消耗	<7W			
待機電源	<0.1W			
最小轉換效率	>90% 輸入高於 210V 及 20%輸出狀況下			
最大轉換效率	>94%	>95%	>95%	>96%
歐洲效率	>93%	>94%	>94%	>95%
GFCI 範圍	參考德國 VDE0126-1-1 法規			
GFCI 電流偵測範圍	0~500mA			
GFCI 電流頻率偵測範圍	0~700Hz			
外箱等級	IP 65			
操作溫度	-25 to 55 ºC			
濕度	0 to 95%, non-condensing(沒有結霜)			
散熱方式	自然散熱			
噪音值	<40dB, A-weighted, frequency up to 20kHz			
海跋高度	Up to 3000m without power de-rating, 5ºC de-rated for each additional 500m			
主機尺寸: W×D×H (mm)	380x300x133	380x300x133	380x300x143	550x300x133
主機重量: Weight (kg)	14	14	14	21
主機含包材尺寸 : W×D×H (mm)	495*465*285	495*465*285	495*465*285	665*465*285
主機含包材重量(kg)	16	16	16	23

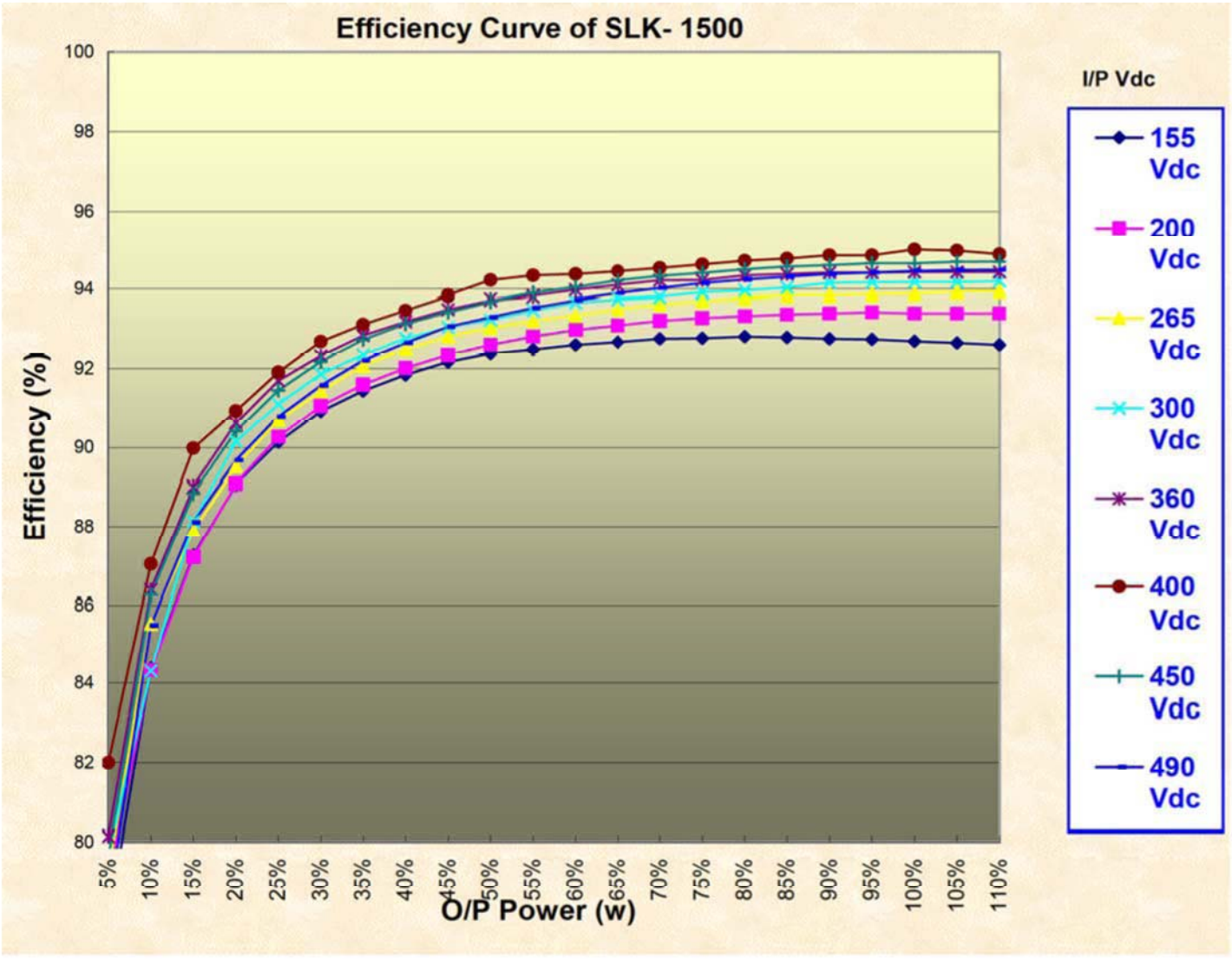
The Efficiency test of SLK- 1500

The Maximum Efficiency table (under different input dc voltage & different output power) :

Table -1 :

Input Vdc / O/P Power (%)	155 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	490 Vdc
75 w	77.96	79.03	79.21	79.68	80.14	82	79.61	78.38
150W	84.38	84.32	85.53	84.31	86.38	87.03	86.25	85.5
225W	87.25	87.21	87.9	88.13	89.02	89.98	88.85	88.12
300W	89.07	89.09	89.52	90.15	90.63	90.94	90.42	89.67
375W	90.14	90.27	90.7	91.11	91.7	91.91	91.46	90.8
450W	90.93	91.07	91.43	91.87	92.33	92.69	92.18	91.58
525W	91.45	91.6	92.07	92.35	92.85	93.13	92.74	92.21
600W	91.85	92.02	92.49	92.77	93.2	93.49	93.14	92.66
675W	92.17	92.35	92.81	93.05	93.51	93.85	93.44	93.07
750W	92.38	92.61	93.03	93.24	93.74	94.23	93.7	93.31
825W	92.49	92.82	93.21	93.48	93.83	94.35	93.91	93.55
900W	92.61	92.99	93.35	93.68	93.98	94.38	94.05	93.74
975W	92.68	93.1	93.51	93.76	94.11	94.45	94.22	93.9
1050W	92.76	93.22	93.63	93.81	94.22	94.54	94.33	94.02
1125W	92.78	93.29	93.71	93.92	94.23	94.63	94.41	94.15
1200W	92.82	93.34	93.78	93.97	94.35	94.72	94.5	94.24
1275W	92.8	93.38	93.85	94.04	94.38	94.78	94.57	94.31
1350W	92.76	93.41	93.85	94.16	94.42	94.86	94.61	94.38
1425W	92.75	93.44	93.87	94.17	94.42	94.86	94.66	94.42
1500W	92.7	93.41	93.89	94.18	94.43	**95.01**	94.66	94.46
1575W	92.66	93.41	93.94	94.18	94.43	94.98	94.69	94.48
1650W	92.61	93.41	93.95	94.2	94.43	94.89	94.7	94.49

The Maximum Efficiency curve :



Calculate the European Efficiency :

The formula :

$\eta_{EU} = (0.03 \times \eta 5\,\%) + (0.06 \times \eta 10\%) + (0.13 \times \eta 20\%) + (0.1 \times \eta 30\%) + (0.48 \times \eta 50\%) + (0.2 \times \eta 100\%)$

according to Table-1

come out :

Input Vdc	155 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	490 Vdc
European Efficiency (%)	90.96	91.25	91.72	91.95	92.48	**93.01**	92.44	91.98

Note : When input voltage is 150Vdc or 200Vdc , both of these conditions can't make PV inverter's output power

reach 100% (4000 w) , therefore can't measure the efficiency (η100%) , so the European Efficiency is "NA".

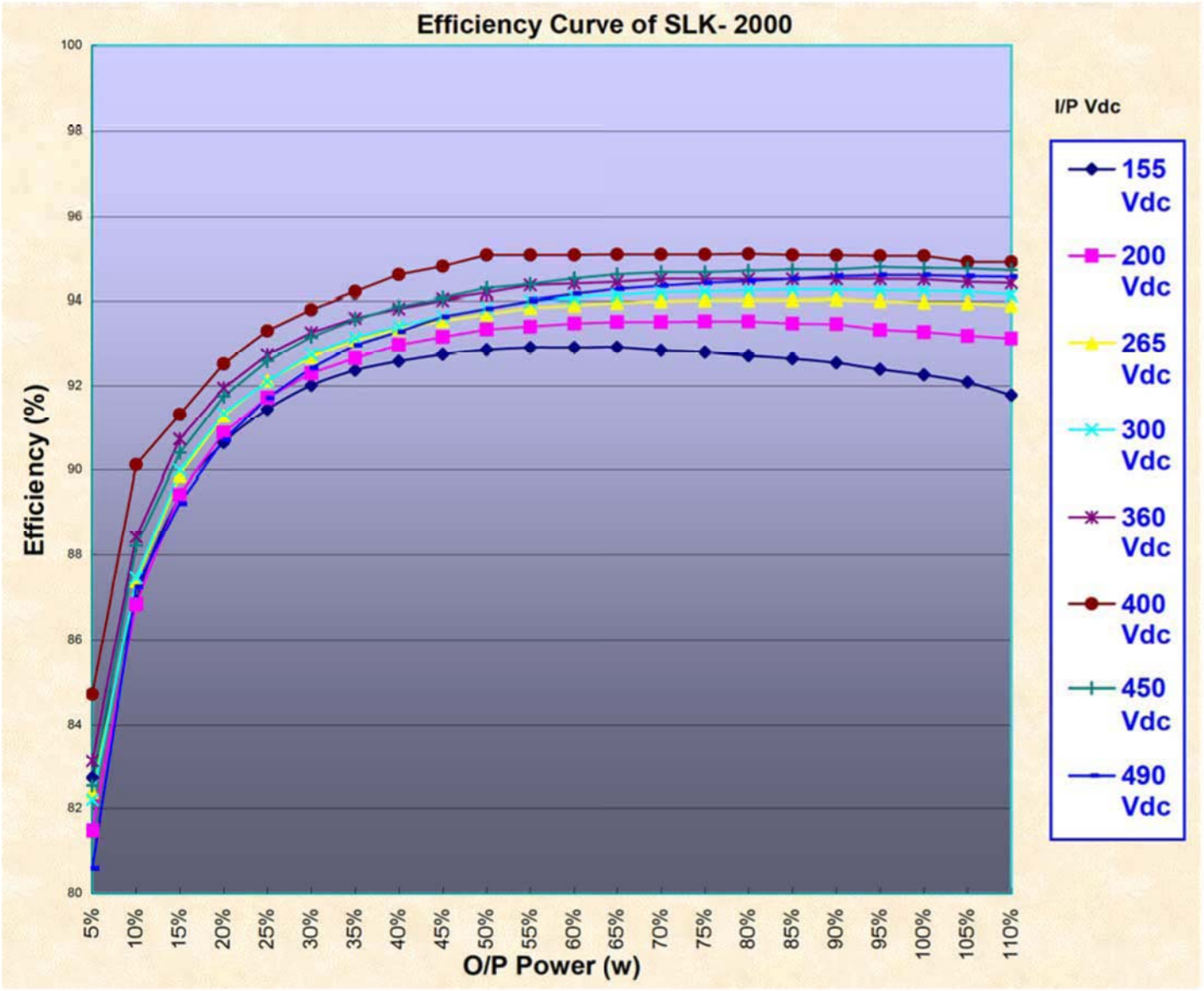
The Efficiency test of SLK- 2000

The Maximum Efficiency table (under different input dc voltage & different output power) :

Table -1 :

Input Vdc / O/P Power (%)	155 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	490 Vdc
100 w	82.74	81.52	82.39	82.21	83.14	84.69	82.55	80.62
200 w	86.92	86.85	87.37	87.45	88.42	90.13	88.21	87.23
300 w	89.4	89.45	89.9	90	90.74	91.33	90.41	89.24
400 w	90.65	90.89	91.3	91.35	91.95	92.52	91.75	90.72
500 w	91.45	91.72	92.12	92.1	92.73	93.3	92.58	91.71
600 w	92.01	92.3	92.68	92.75	93.25	93.8	93.15	92.42
700 w	92.37	92.65	93.06	93.13	93.6	94.2	93.56	92.95
800 w	92.58	92.96	93.34	93.4	93.82	94.6	93.87	93.28
900 w	92.74	93.15	93.53	93.64	94.02	94.8	94.06	93.63
1000 w	92.85	93.33	93.69	93.83	94.17	95.07	94.28	93.82
1100w	92.9	93.4	93.84	93.98	94.35	95.07	94.38	94
1200 w	92.9	93.47	93.9	94.07	94.39	95.07	94.51	94.14
1300 w	92.91	93.51	93.96	94.12	94.43	95.08	94.61	94.26
1400 w	92.84	93.51	94	94.18	94.5	95.08	94.66	94.33
1500 w	92.79	93.52	94.02	94.2	94.5	95.08	94.66	94.4
1600 w	92.71	93.52	94.02	94.23	94.5	**95.09**	94.69	94.45
1700 w	92.64	93.47	94.02	94.25	94.5	95.07	94.72	94.5
1800 w	92.54	93.46	94.03	94.25	94.5	95.06	94.72	94.56
1900 w	92.39	93.32	94	94.23	94.5	95.05	94.78	94.59
2000 w	92.26	93.27	93.97	94.22	94.49	95.05	94.76	94.59
2100 w	92.09	93.18	93.95	94.2	94.43	94.9	94.75	94.56
2200 w	91.78	93.11	93.89	94.13	94.4	94.9	94.71	94.55

The Maximum Efficiency curve :



Calculate the European Efficiency :

The formula :

$\eta_{EU} = (0.03 \times \eta 5\,\%) + (0.06 \times \eta 10\%) + (0.13 \times \eta 20\%) + (0.1 \times \eta 30\%) + (0.48 \times \eta 50\%) + (0.2 \times \eta 100\%)$

according to Table-1

come out :

Input Vdc	155 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	490 Vdc
European Efficiency(%EU)	91.71	92.15	92.62	92.75	93.18	**94.00**	93.22	92.64

Note : When input voltage is 150Vdc or 200Vdc , both of these conditions can't make PV inverter's output power reach 100% (4000 w) , therefore can't measure the efficiency ($\eta 100\%$) , so the European Efficiency is "NA".

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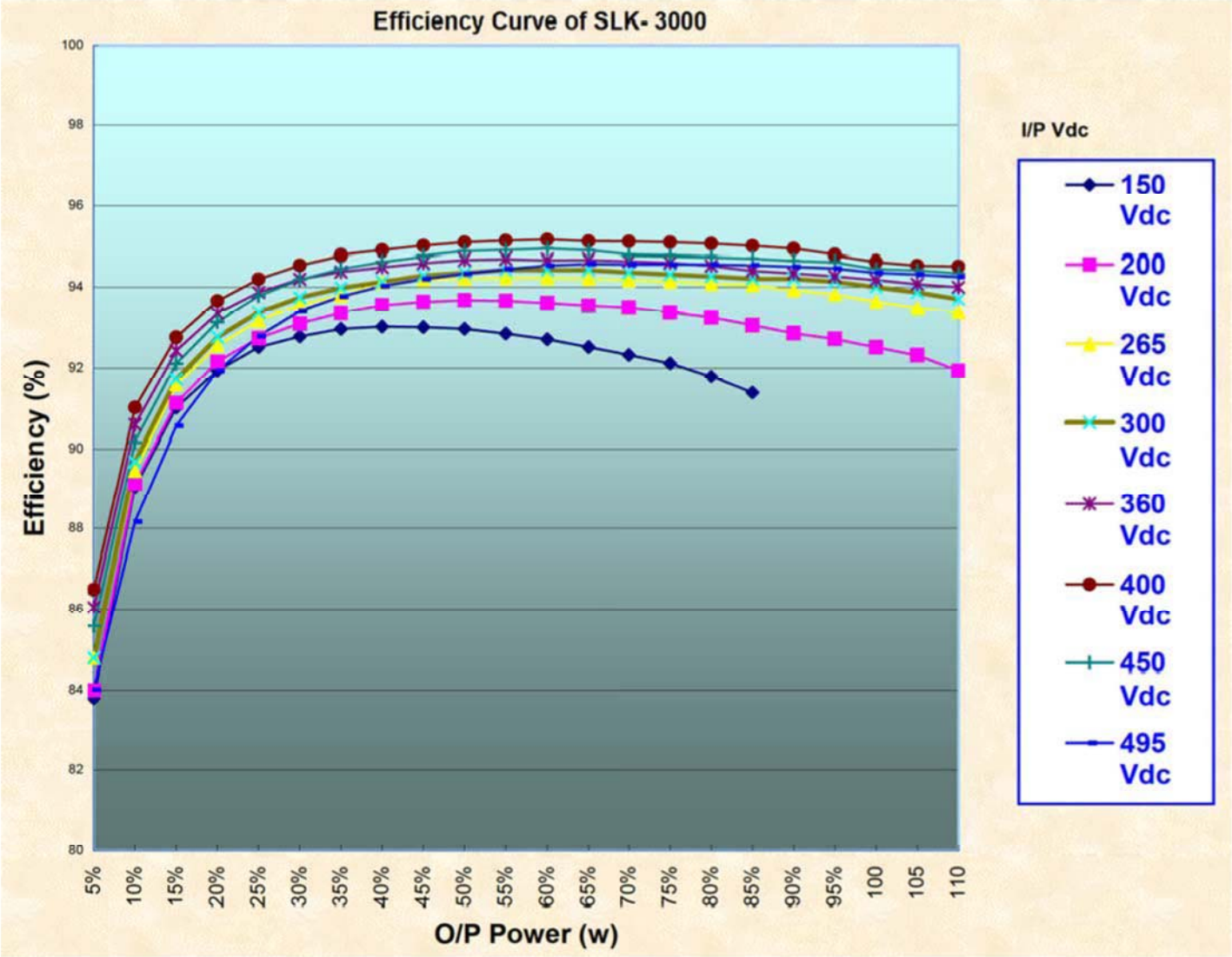
The Efficiency test of SLK- 3000

The Maximum Efficiency table (under different input dc voltage & different output power) :

Table -1 :

Input Vdc / O/P Power(%)	150 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	495 Vdc
150 w	83.8	84	84.77	84.78	86.05	86.5	85.57	84.01
300 w	89.05	89.14	89.45	89.68	90.58	91.01	90.17	88.17
450 w	91	91.12	91.58	91.72	92.43	92.76	92.11	90.55
600 w	91.94	92.16	92.55	92.76	93.35	93.66	93.13	91.93
750 w	92.52	92.74	93.16	93.37	93.87	94.2	93.78	92.79
900 w	92.78	93.1	93.55	93.74	94.2	94.55	94.19	93.4
1050 w	92.97	93.36	93.78	93.98	94.38	94.78	94.46	93.77
1200 w	93.02	93.55	94.12	94.13	94.5	94.9	94.63	94.03
1350 w	93.01	93.63	94.18	94.29	94.6	95.01	94.76	94.2
1500 w	92.97	93.67	94.2	94.36	94.68	95.09	94.87	94.33
1650 w	92.85	93.66	94.22	94.43	94.7	95.13	94.9	94.45
1800 w	92.71	93.6	94.22	94.43	94.67	**95.16**	94.93	94.54
1950 w	92.52	93.54	94.2	94.43	94.68	95.12	94.89	94.58
2100 w	92.33	93.49	94.17	94.37	94.64	95.11	94.79	94.57
2250 w	92.12	93.37	94.13	94.32	94.61	95.09	94.77	94.57
2400 w	91.61	93.25	94.08	94.27	94.53	95.06	94.74	94.57
2550 w	90.61	93.06	94.04	94.21	94.41	95	94.71	94.55
2700 w		92.86	93.92	94.21	94.35	94.93	94.66	94.51
2850 w		92.72	93.81	94.14	94.27	94.79	94.62	94.47
3000 w		92.51	93.63	94	94.18	94.69	94.45	94.36
3150 w		92.32	93.47	93.87	94.08	94.54	94.42	94.32
3300 w		91.94	93.37	93.7	94	94.52	94.35	94.26

The Maximum Efficiency curve :



Calculate the European Efficiency :

The formula :

$\eta_{EU} = (0.03 \times \eta 5\ \%) + (0.06 \times \eta 10\%) + (0.13 \times \eta 20\%) + (0.1 \times \eta 30\%) + (0.48 \times \eta 50\%) + (0.2 \times \eta 100\%)$

according to Table-1

come out :

Input Vdc	150 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	495 Vdc
European Efficiency (%)	NA	92.62	93.24	93.45	93.85	94.26	93.93	93.25

Note : When input voltage is 150Vdc or 200Vdc , both of these conditions can't make PV inverter's output power reach 100% (4000 w) , therefore can't measure the efficiency ($\eta 100\%$) , so the European Efficiency is "NA".

The Efficiency test of SLK- 4000

The Maximum Efficiency table (In different input dc voltage & different output power) :

Input Vdc / O/P Power	150 Vdc	200 Vdc	265 Vdc	300 Vdc	360 Vdc	400 Vdc	450 Vdc	495 Vdc
200 w	85.04%	85.89%	86.22%	87.19%	88.67%	88.93%	87.32%	86.33%
400 w	89.63%	89.84%	90.63%	91.1%	92.07%	92.69%	91.3%	89.59%
600 w	91.7%	91.9%	92.41%	92.95%	93.63%	94.2%	93.09%	92.01%
800 w	92.71%	92.93%	93.39%	93.85%	94.55%	94.91%	94.11%	93.48%
1000 w	93.23%	93.57%	94.02%	94.41%	95.02%	95.36%	94.71%	94.5%
1200 w	93.57%	93.94%	94.38%	94.69%	95.29%	95.71%	95.12%	94.61%
1400 w	93.7%	94.08%	94.58%	94.91%	95.41%	95.8%	95.35%	94.72%
1600 w	93.81%	94.28%	94.72%	95.06%	95.55%	95.98%	95.49%	94.91%
1800 w	93.82%	94.34%	94.89%	95.13%	95.61%	**96.03 %**	95.62%	95.09%
2000 w	93.77%	94.4%	94.89%	95.15%	95.6%	**96.04 %**	95.7%	95.23%
2200 w	93.69%	94.36%	94.92%	95.16%	95.6%	**96.03 %**	95.72%	95.27%
2400 w	93.55%	94.32%	94.92%	95.16%	95.56%	**96 %**	95.7%	95.31%
2600 w	93.39%	94.28%	94.87%	95.12%	95.5%	95.98%	95.7%	95.34%
2800 w	93.09%	94.17%	94.83%	95.08%	95.45%	95.9%	95.7%	95.36%
3000 w	NA	94.07%	94.79%	95.03%	95.38%	95.88%	95.68%	95.35%
3200 w	NA	94.01%	94.74%	94.98%	95.37%	95.84%	95.68%	95.21%
3400 w	NA	93.88%	94.68%	94.94%	95.28%	95.81%	95.63%	95.16%
3600 w	NA	93.75%	94.59%	94.84%	95.22%	95.71%	95.58%	95.13%
3800 w	NA	NA	94.48%	94.76%	95.15%	95.63%	95.5%	95.07%
4000 w	NA	NA	94.37%	94.66%	95.04%	95.56%	95.41%	95.01%
4200 w	NA	NA	94.23%	94.56%	94.93%	95.5%	95.31%	94.66%
4400 w	NA	NA	94.01%	94.47%	94.75%	95.42%	95.01%	94.1%

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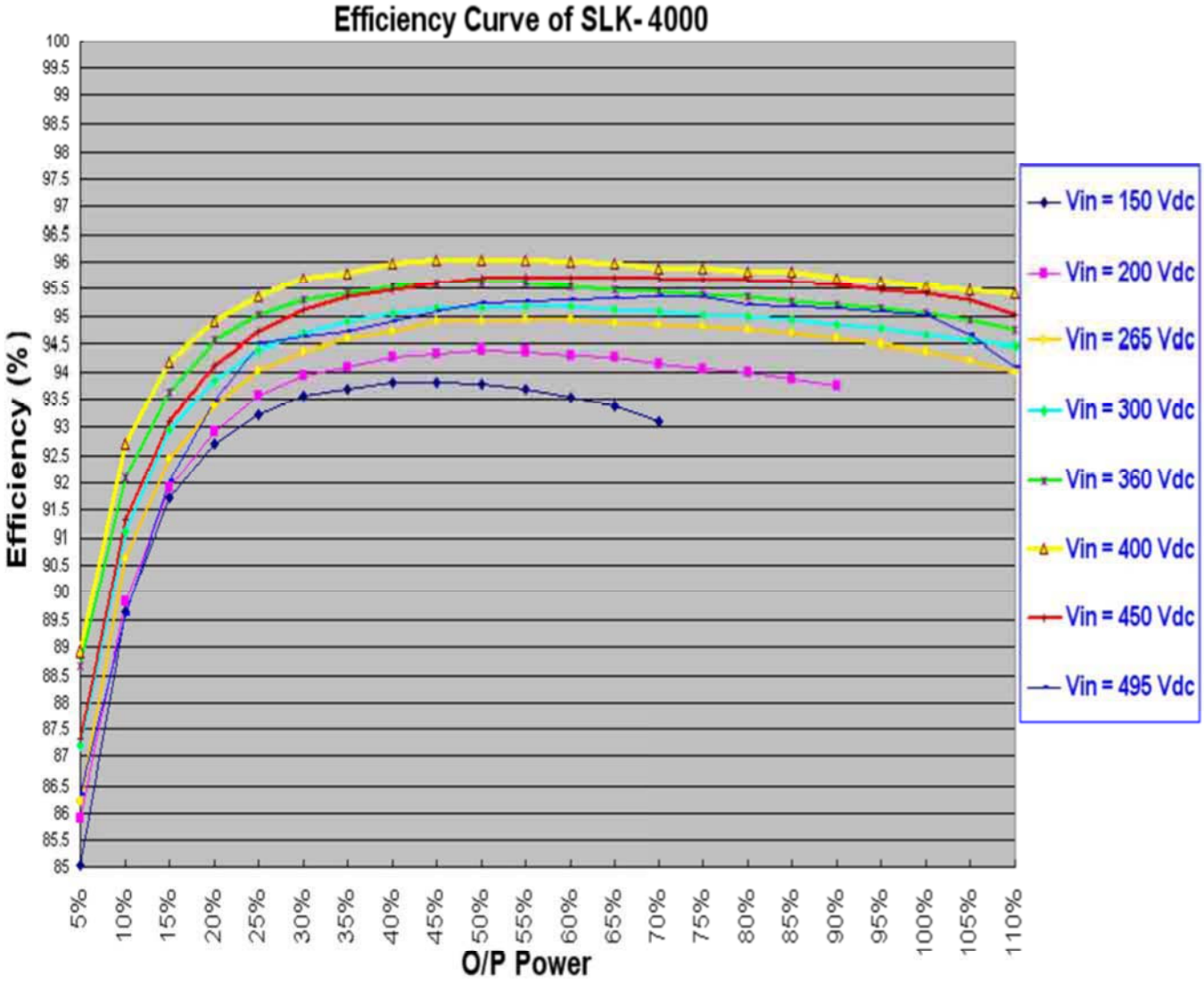
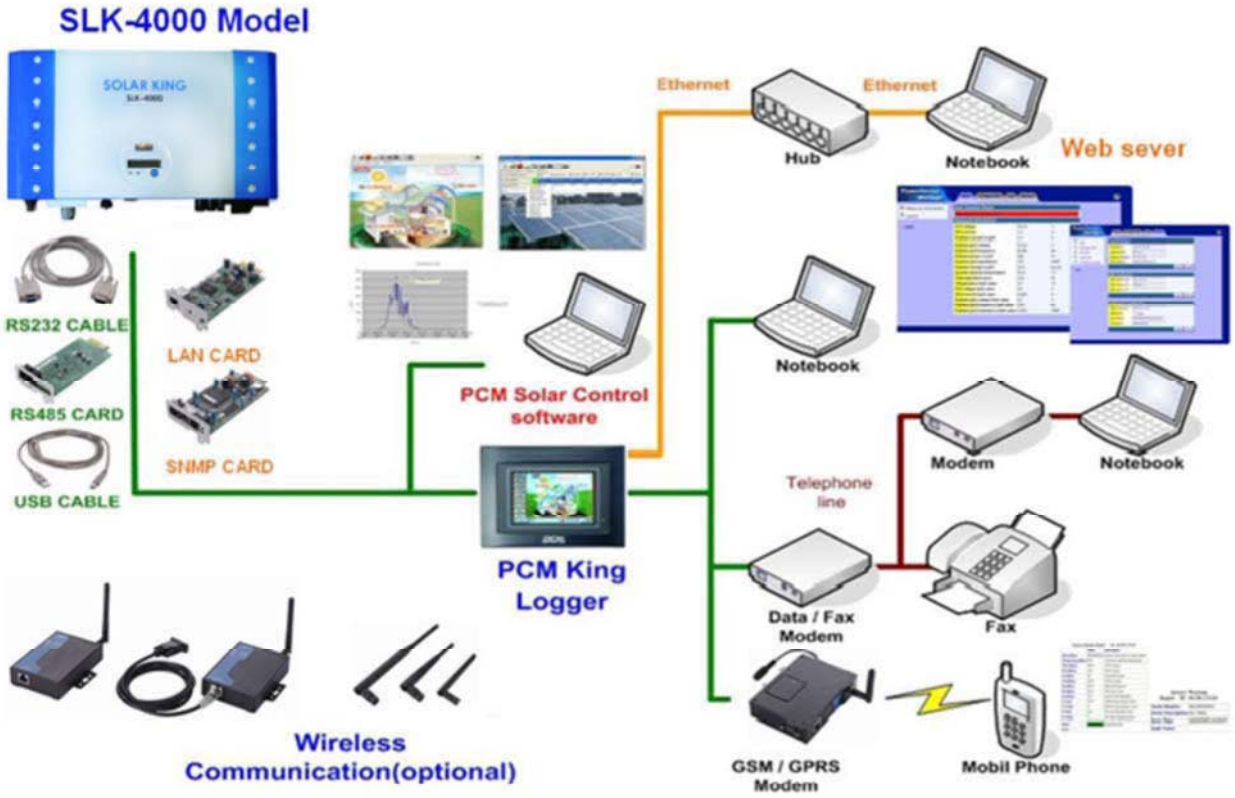
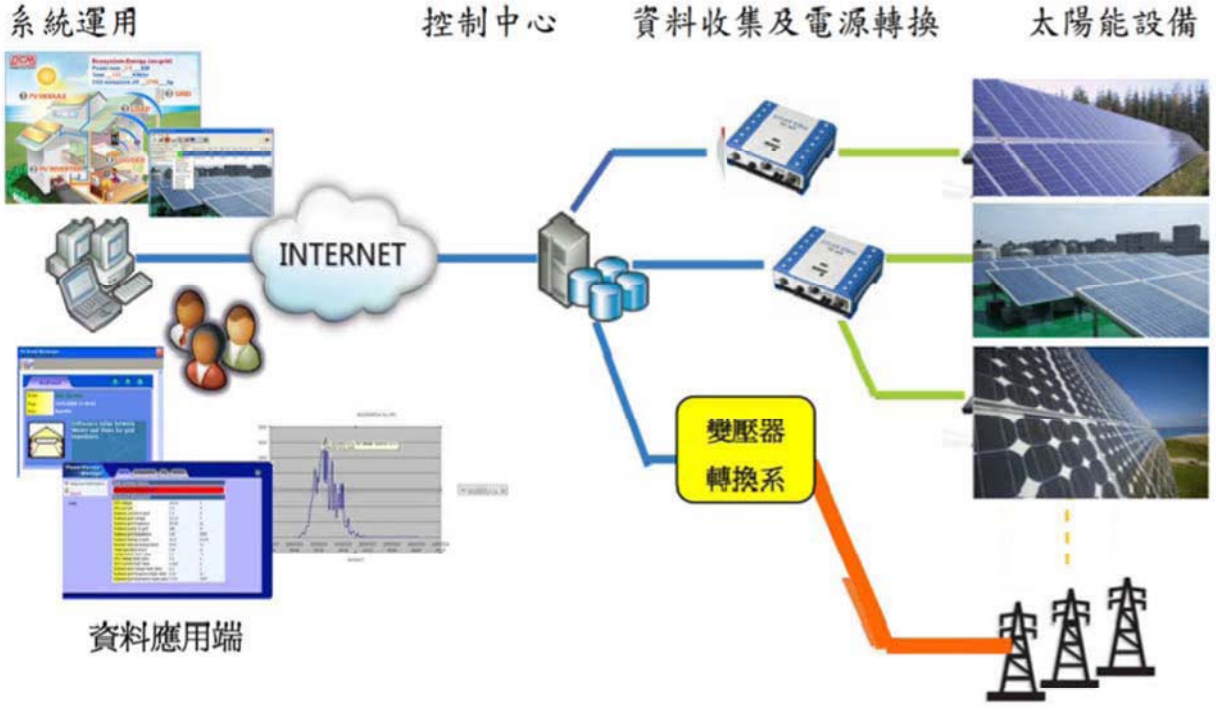


Input Vdc	150	200	265	300	360	400	450	495
European Efficiency (η_{EU})	NA	NA	94.02 %	94.36 %	94.90 %	95.35 %	94.86 %	94.29 %

通訊介面

On grid PCM Solar Inverter communication system diagram.





併聯主動保護功能

科風股份有限公司生產太陽能 SLK 系列併聯型變流器(PV Inverter)

通過 VDE 0126-1-1 認證，具有與市電併聯保護特性，功能如下：

保護功能項目	設定值	保護範圍/保護措施
過電壓保護(OVR)	256Vdc	254Vdc~258Vdc/200ms 內跳脫
低電壓保護(UVR)	198Vdc	196Vdc~200Vdc/200ms 內跳脫
過頻率保護(OFR)	60.3 Hz	0~0.1Hz(60.3Hz~60.4Hz)/200ms 內跳脫
低頻率保護(UFR)	59.7 Hz	-0.1~0Hz(59.6Hz~59.7Hz)/ 200ms 內跳脫
孤島保護		0.5 秒內跳脫
主動防孤島運轉		市電阻抗偵測或主動頻率擾動
復電後變流器在併聯時間		≧5 分鐘(可由軟體調整 30~300s)
功率因數		＞95%
輸出直流成分		≦0.5%額定輸出電流
併聯電壓閃爍		＜0.45%
諧波電流		符合 IEC 61000-3-2

符合上述併聯條件保護功能、特性之 SLK 系列 Inverter 包含：

(1) SLK-1500
(2) SLK-2000
(3) SLK-3000
(4) SLK-4000

併聯主動保護功能

科風股份有限公司生產太陽能 SLK 系列併聯型變流器(PV Inverter)通過 VDE 0126-1-1 認證，保護特性如下：

1. AC 輸出保護部份:主動保護及被動保護

主動保護:頻率擾動

被動保護:高低壓保護、高低頻保護、過電流保護、漏電流保護、雷擊保護。

2. DC 輸入保護部份：(1)模組絕緣阻抗偵測

(2)輸入過電流保護

(3)輸入過電壓警告

(4)逆偏保護(模組＋，－極反接保護)

符合上述併聯條件保護功能、特性之 SLK 系列 Inverter 包含：

(5) SLK-1500
(6) SLK-2000
(7) SLK-3000
(8) SLK-4000

VDE

ZERTIFIKAT
CERTIFICATE

Erzeugnis *Product*	**PV-Wechselrichter mit selbsttätiger Freischaltstelle** **Photovoltaic converter with automatic disconnecting device**
Typenbezeichnung *Type designation*	**SLK-1500, SLK-2000, SLK-3000;**
Technische Merkmale *Technical characteristics*	**Max. Eingangsspannung / max. input range:DC 500 V** **MPP Spannungsbereich / MPP voltage range: DC 100-500 V** **Nennausgangsspannung/ Rated output voltage AC 230 V / 50 Hz** **max. Ausgangsleistung/ max. output power: AC 1,5 / 2,0 / 3,0 kW**
Prüfbericht Nr. / *Test Report Ref. No.* *Ausstellungsdatum / Date of issue*	**Project No. 2.04.00612.1.0** **2008-12-17**
Angewandte Normen *Applied standards*	**DIN V VDE 0126-1-1 (VDE V 0126-1-1)**
Bestimmungsgemäße Verwendung *Intended use*	**Selbsttätig wirkende, dem EVU unzugängliche Schaltstelle mit Trennfunktion, als gleichwertiger Ersatz für eine jederzeit dem EVU zugängliche Schaltstelle mit Trennfunktion.** **Automatic disconnecting facility not accessible by energy Supply company as equivalent replacement of a disconnecting facility permanently accessible to energy supply company**

Ein Muster dieses Erzeugnisses wurde geprüft und die Übereinstimmung mit den angewandten Normen festgestellt. Der oben genannte Prüfbericht ist Grundlage dieses Zertifikates.
A sample of the product has been tested and found to be in conformity with the applied standards. The above mentioned Test Report is part of this certificate.

Dieses Zertifikat darf Dritten nur in Verbindung mit dem oben genannten Prüfbericht im vollen Wortlaut und unter Angabe des Ausstellungsdatums zur Kenntnis gegeben werden.
This certificate may only be passed to a third party in combination with the above mentioned Test Report in its complete wording and the date of issue.

VDE Prüf- und Zertifizierungsinstitut
VDE Testing and Certification Institute
Fachbereich F1
Department F1

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D-63069 Offenbach am Main, **09. Februar 2009**
Merianstraße 28

VDE-Form 111 .01/02

VDE Prüf- und Zertifizierungsinstitut

VDE VERBAND DER ELEKTROTECHNIK
ELEKTRONIK INFORMATIONSTECHNIK e.V.

ZERTIFIKAT
CERTIFICATE

Erzeugnis *Product*	PV-Wechselrichter mit selbsttätiger Freischaltstelle Photovoltaic converter with automatic disconnecting device
Typenbezeichnung *Type designation*	SLK-4000-DE
Technische Merkmale *Technical characteristics*	Nenn-Eingangsspannung/ rated input voltage:DC360V Eingangsspannungsbereich/ rated input voltage: DC 100-500 V Nennausgangsspannung/ Rated output voltage AC 230 V / 50 Hz max. Ausgangsleistung/ max. output power: 4400 W
Prüfbericht Nr. / *Test Report Ref. No.* *Ausstellungsdatum / Date of issue*	Project No. 2.04.00503.1.0 2008-01-31
Angewandte Normen *Applied standards*	DIN V VDE 0126-1-1 (VDE V 0126-1-1)
Bestimmungsgemäße Verwendung *Intended use*	Selbsttätig wirkende, dem EVU unzugängliche Schaltstelle mit Trennfunktion, als gleichwertiger Ersatz für eine jederzeit dem EVU zugängliche Schaltstelle mit Trennfunktion. Automatic disconnecting facility not accessible by energy Supply company as equivalent replacement of a disconnecting facility permanently accessible to energy supply company

Ein Muster dieses Erzeugnisses wurde geprüft und die Übereinstimmung mit den angewandten Normen festgestellt. Der oben genannte Prüfbericht ist Grundlage dieses Zertifikates.
A sample of the product has been tested and found to be in conformity with the applied standards. The above mentioned Test Report is part of this certificate.

Dieses Zertifikat darf Dritten nur in Verbindung mit dem oben genannten Prüfbericht im vollen Wortlaut und unter Angabe des Ausstellungsdatums zur Kenntnis gegeben werden.
This certificate may only be passed to a third party in combination with the above mentioned Test Report in its complete wording and the date of issue.

VDE Prüf- und Zertifizierungsinstitut
VDE Testing and Certification Institute
Fachbereich F1
Department F1

D-63069 Offenbach am Main, **31. Januar 2008**
Merianstraße 28

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