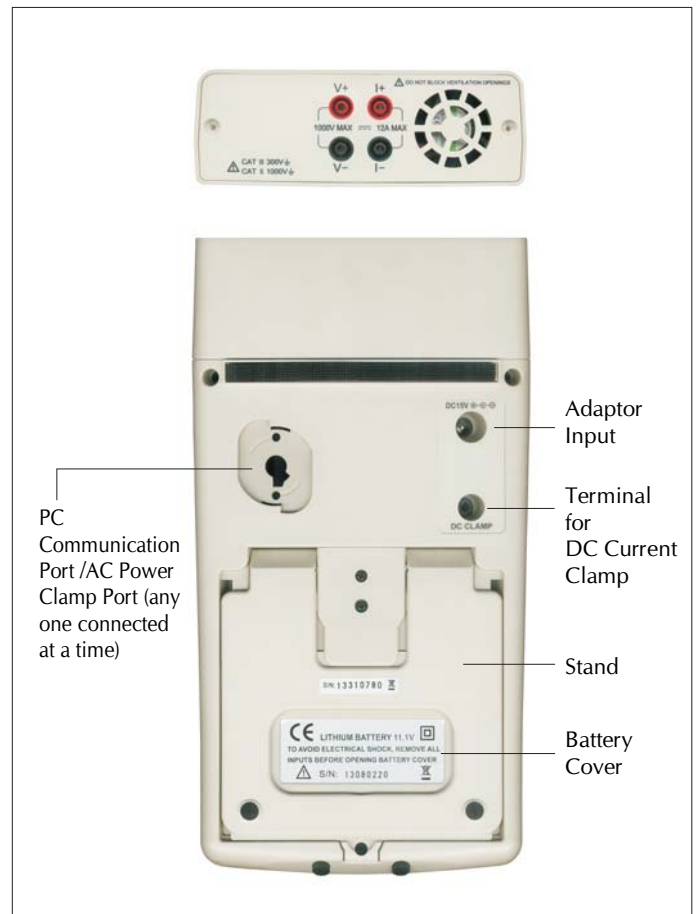


MECO Solar System Analyzer Model 9018BT is Portable Analyzer used for Testing, Monitoring, Measuring, Analyzing and Troubleshooting various parameters of Solar System. This System has Intelligent Test Logic with no personal attendance required. The System continuously monitor DC Output of Solar System and AC Power Output of Inverter, Calculate Efficiency of DC to AC Power Conversion and Maximum Output Power.

**Features**

- I-V Curve Test for Solar System
- Max. Solar System Power (Pmax) search by Auto-Scan : 1000V, 12A (12000W Capability)
- The Analyzer and the Remote Solar Detector is connected by Bluetooth Wireless Communication (Bluetooth 2.1 + EDR Class 1)
- The Remote Solar Detector is Moisture-Proof.
- Intelligent Test Logic with no personnel attendance required in the field.
- Solar System Analyzer waits and tests the system until appropriate Sunlight Irradiance is detected.
- Max. Voltage (Vpm) at Pmax, Max. Current (Ipm) at Pmax
- Voltage at Open Circuit (Voc), Current at Short Circuit (Isc)
- Efficiency (%) Calculation of Solar System
- Temperature Measurement of Solar Panels
- Irradiance Measurement of Sun Light
- Series Resistance (Rs) Calculation of Solar Panels
- With Data Logging/Open Function, the I-V Curves of Solar System can be analysed / recorded for a period of time (e.g. 60 min.)
- Conversion of I-V Curve under OPC to data under Standard Test Condition (STC) based upon IEC Standard
- Built-in Calendar Clock
- Users can set up the Parameters of Solar Panels
- Users can set up the Series number of Solar Panels. Parameters of many Solar Panels can be Measured in One Measurement.
- The Irradiances and Temperatures of Solar Panels can be continuously Measured, Monitored and Recorded.
- Rechargeable Lithium Battery, Low Battery Warning, AC Power Adaptor
- Optical USB Cable for PC Communication
- Solar Connector (optional)
- Provide Operating Condition (OPC) and Standard Test Condition (STC) test reports for Verification of Solar Panel Performance (OK, or NO OK)
- With Power Clamps (SOLAR 15 DC Current Probe and SOLAR 21 AC Power Clamp), continuously measure / monitor / record the DC Power output of Solar System and the AC Power Output of Inverter (1 phase or balanced 3 phases); calculate the Efficiency of DC to AC Power Conversion and the Efficiency of the max. output power.

**Top & Rear Panel Connections**



## General Specifications for Solar System Analyzer

<b>Battery Type</b>	Rechargeable Lithium Battery (3400mAh)
<b>Battery Life</b>	400 times of linear scan (1000V ~ 1V, 0.1A ~ 12A), 8 hours for standby mode.
<b>Memory Size</b>	512K Bytes (3980 Mod files or 320 REC files or 3980 PWR files or 3980 IRR files)
<b>AC Adaptor</b>	AC 100 ~ 240V input, DC 15V / 1 ~ 3A output
<b>Dimension</b>	260 x 158 x 64mm (approx.)
<b>Weight</b>	1580gms Batteries included (approx.)
<b>Operation Environment</b>	50°C ~ 50°C, 85% RH
<b>Temperature</b>	0.1% of full scale / °C
<b>Coefficient</b>	(< 18°C or > 28°C)
<b>Storage Environment</b>	-20°C ~ 60°C, 75% RH
<b>Accessories</b>	Solar Irradiance Meter (Remote Solar Detector) x 1, Thermometer x1, USB power cord x1, User manual x1, AC adaptor x1, Optical USB cable x1, Rechargeable lithium battery (3400mAh) x1 (installed), Software CD x1, Software manual x1, Carrying bag x1, Thermal conductive gel x1, Testing clips (1 black & 1 red), Extension Cable x 1, 4-wire to 2-wire connecting cable x1, 4-wire testing cable x1, Solar 15 : DC current probe x1, Solar 21: AC power clamp x1, <b>Optional</b> : Solar Connector (1 black & 1 red)

**Electrical Specifications** (23°C ± 5°C, Irradiance ≥ 800W/m<sup>2</sup>,  
Four-Wire Measurement, Maximum  
Power Limit is 12000W)

### DC Voltage Measurement

Range	Resolution	Accuracy
0 ~ 1000V	0.01 V / 0.1 V / 1 V	± 1% ± (1% of Voc ± 0.1 V)

Voc : open circuit voltage of solar system

### DC Current Measurement

Range	Resolution	Accuracy
0.1 ~ 12A	1mA / 10mA	± 1% ± (1% of Isc ± 9mA)

Isc : short circuit current of solar system

### DC Current Simulation

Range	Resolution	Accuracy
0.1 ~ 12A	1mA / 10mA	± 1% ± 9mA

### Irradiance Measurement

Range	Resolution	Accuracy
0 ~ 2000W/m <sup>2</sup>	1W/m <sup>2</sup>	± 3% ± 20dgt

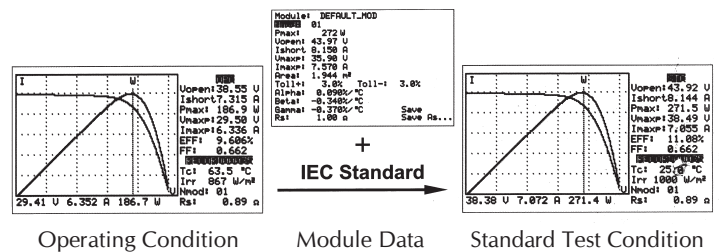
### Temperature Measurement

Range	Resolution	Accuracy
-22 ~ 85°C	0.1°C	± 1% ± 1°C

## Electrical Specifications for AC Power Clamp (Solar 21)

AC Watt (50 or 60Hz, PF 0.6 to 1. CT = 1, Accuracy of Readings)		
Range (0 to 30A)	Resolution	Accuracy of Readings
0.050 - 9.999W	0.001W	± 2% ± 0.025W
10.00 - 99.99W	0.01W	± 2% ± 0.25W
100.0 - 999.9W	0.1W	± 2% ± 2.5W
1.000 - 9.999KW	0.001KW	± 2% ± 0.025KW
10.00 - 99.99KW	0.01KW	± 2% ± 0.25KW
100.0 - 999.9KW	0.1KW	± 2% ± 2.5KW
1000 - 9999KW	1KW	± 2% ± 25KW

## Conversion of OPC Data into STC Data



## AC Power Clamp (Solar 21)

### Features

- Active (W, KW, HP), Reactive (VAR, KVAR) & Apparent (VA, KVA) Power
- Power factor (PF), Phase angle (Φ), & Energy (mWH, WH, KWH)
- Measurement of standby power consumption for IT products
- Non-interrupted AC current harmonic analysis
- 1 to 99th order of harmonics at 1.0% basic accuracy
- Total harmonic distortion (%THD-F) & crest factor (CF)
- True RMS measurement of V & A at 0.5% basic accuracy
- Fast peak function (39μs for 50Hz, 33μs for 60Hz)
- Measurement of balanced 3Φ power
- Measurement of balanced 3Φ sequence
- Programmable CT ratio from 1 to 250
- Max, Min & Data hold functions
- Leakage current measurement at 10μA resolution
- Active power in H.P.
- Shielded jaw immune to external interference

AC Voltage (50 or 60Hz, True RMS)			
Range	Resolution	Accuracy (50 or 60Hz)	Accuracy (45 - 1KHz)
5 - 250V	0.1 V	±0.5% ± 5 dgt	± 1.5% ± 5 dgt
250 - 600V			

Harmonics of AC Voltage in % & Magnitude (1 - 99th order)				
Range	Resolution in %	Accuracy in %	Resolution in Magnitude	Accuracy in Magnitude
1 - 10th	0.1 %	± 1% of reading ± 1%	0.1V	± 1% of reading ± 7 dgts
11 - 20th		± 5% of reading ± 1%		± 5% of reading ± 7 dgts
21 - 50th		± 15% of reading ± 1%		± 15% of reading ± 7 dgts
51 - 99th		± 35% of reading ± 1%		± 35% of reading ± 7 dgts

Harmonics of AC Current in % & Magnitude (1 - 99th order)				
Range	Resolution in %	Accuracy in %	Resolution in Magnitude	Accuracy in Magnitude
1 - 10th	0.1 %	± 1% of reading ± 1%	0.01mA/ 0.1mA/ 0.001A/ 0.01A	reading in mA : ± 1% of reading ± 2mA reading in A : ± 1% of reading ± 0.3A
11 - 20th		± 5% of reading ± 1%		reading in mA : ± 7% of reading ± 2A reading in A : ± 7% of reading ± 0.3A
21 - 50th		± 15% of reading ± 1%		reading in mA : ± 15% of reading ± 3mA reading in A : ± 15% of reading ± 0.3A
51 - 99th		± 35% of reading ± 1%		reading in mA : ± 35% of reading ± 3mA reading in A : ± 35% of reading ± 0.3A

Frequency (Hz)			
Range	Resolution	Accuracy of Readings	Allowed Input
mA (45 - 65Hz)	0.1 Hz	± 0.5Hz	20mA - 1.2A
A (45 - 65Hz)			1A - 100A

Power Factor (PF, ACV > 4V, AC mA > 1mA, AC A > 0.04A, Watt > 50dgts) & Phase Angle (Φ, 50 or 60Hz)		
Range	Resolution	Accuracy
0.000 - 1.000	0.001	± 0.04
-180° to 180° & 0° to 360°	0.1°	± 2°

AC Watt (50 or 60Hz, PF 0.6 to 1. CT = 1, Accuracy of Readings)		
Range (30 to 50A)	Resolution	Accuracy
0.050 - 9.999W	0.001W	± 2% of VA ± 5 dgts
10.00 - 99.99W	0.01W	
100.0 - 999.9W	0.1W	
1.000 - 9.999KW	0.001KW	
10.00 - 99.99KW	0.01KW	
100.0 - 999.9KW	0.1KW	
1000 - 9999KW	1KW	

Total Harmonic Distortion (THD-F, 1 - 50th order)		
Range (45 to 65Hz)	Resolution	Accuracy
0.0 - 10.0%	0.1 %	± 2%
10.0 - 40%		± 5% of reading ± 5%
40 - 100%		± 10% of reading ± 10%
100 - 999.9%		± 20% of reading

Peak Value of AC Periodic Voltage or AC Periodic Current		
Range	Sampling Time	Accuracy of Readings
50Hz	39μs	± 5% ± 30 dgts
60Hz	33μs	

Crest Factor (C.F., Accuracy of Readings)		
Range	Resolution	Accuracy of Readings
1.00 - 99.99	0.01	± 5% ± 30 dgts

**Product Kit**





## DC Current Probe (Solar 15)

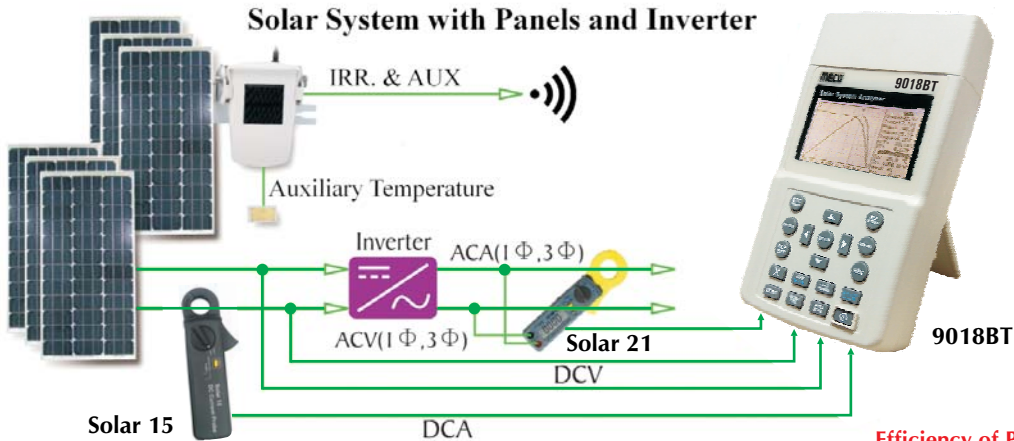
### Features

- Accurate DC Current Probe for Current Measurement
- One Touch Zero for DCA adjustment
- 23mm Diameter Jaw

## Electrical Specifications for DC Current Probe (Solar 15)

Range	Resolution	Accuracy
DC 12A	1mA / 10mA	± 2.0% ±30mA

## Applications



### A. Quality Control at Production Line, Warehouse or Site of Installation

- Manufacturers of solar panels can test the characteristics for quality control purpose at the production line.
- Installation engineers can randomly test samples of solar panels at site to verify the quality of solar panels used at site of installation.

### B. Identify Requirements of Solar Power System

- The unit can measure actual max. power (Pmax), voltage (Vpm) and current (Ipm) at max. power.
- Instead of the rated max. power, system designers need to be aware of the actual solar power from solar panels under actual operating conditions.

### C. Maintenance of Solar Panels

- Maintenance engineers can store the characteristics data of solar panels in the beginning. And compare the characteristics data in weekly, monthly or yearly maintenances.

### D. Verify the Best Installation Angles of Solar Panels

- Engineers can collect data of the installation angles at different dates and time by using the unit at site of installation.
- The data can be used as a reference to design the automated angle adjustment system or the data can be used to select an optimal angle for a fixed angle installation.

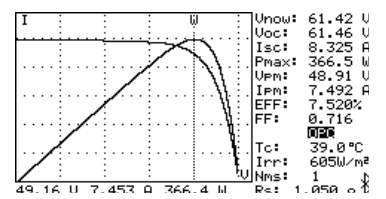
### E. Measure / Monitor / Record the DC Power Output & Efficiency

- Continuously Measure / Monitor / Record the DC power output of solar system and the AC power output of inverter (1 phase or balanced 3 phases)
- Calculate the efficiency of DC to AC power conversion and the efficiency of the max. output power

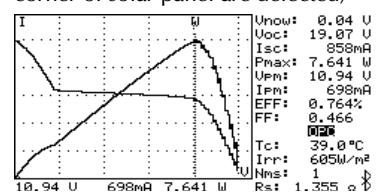
### Efficiency of Power Mode

DC POWER	AC POWER 1P2W
Uoc: 82.15 U	335.2 W
Isc: 5.880 A	70.40 U
Ump: 347.3 U	4.761 A
Ipm: 70.43 U	0.997
Ipm: 4.931 A	EFF(Pmax)
Irr: 1050W/m²	96.5%
Tc: 51.2°C	EFF: 97.2%
Alpha: 0.090/°C	FF: 337.2 W
Beta: -0.340/°C	Fi: 313.2 W
Gamma: -0.370/°C	PF: 0.997
Irrh: 87.5 W/m²	ET: 0 : 5 : 0
CPmax: 28.9 W/m²	Ph: 28.1 W/m²

### Normal I-V Curve



### Abnormal I-V Curve (Cells at the corner of solar panel are defected)

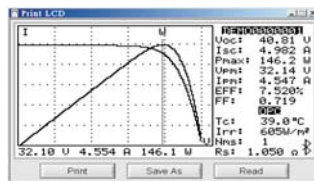


## User Interface and Data Acquisition Software

### File List

File List	Mod	Time	Size
DEFAULT.MCO	REC	2012-10-22	116.40 KB
RECORD0001	REC	2012-10-22	16.29 KB
RECORD0002	REC	2012-10-22	16.30 KB
RECORD0003	REC	2012-10-22	16.31 KB
RECORD0004	REC	2012-10-22	16.34 KB
RECORD0005	REC	2012-10-22	16.35 KB
RECORD0006	REC	2012-10-22	16.36 KB
RECORD0007	REC	2012-10-22	16.37 KB
RECORD0008	REC	2012-10-22	16.37 KB
RECORD0009	REC	2012-10-22	16.40 KB
RECORD0010	REC	2012-10-22	16.41 KB
RECORD0011	REC	2012-10-22	16.42 KB
RECORD0012	REC	2012-10-22	16.43 KB
RECORD0013	REC	2012-10-22	16.44 KB
RECORD0014	REC	2012-10-22	16.45 KB

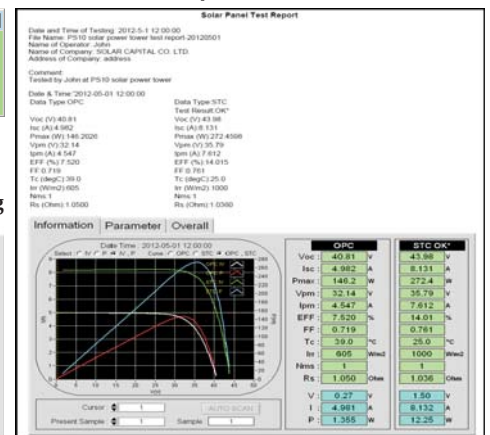
### Print LCD



### Cycle Scan




### Solar Panel Test report



Date and Time of Testing: 2012-5-1 12:00:00  
File Name: 2012 solar power test report 20120501  
Name of Operator: John  
Name of Company: SOLAR CAPITAL CO. LTD.  
Address of Company: address

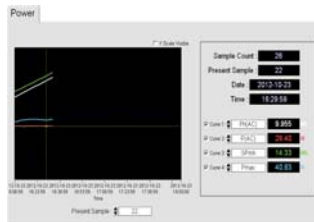
Uoc: 40.81 U  
Isc: 4.962 A  
Pmax: 146.2 W  
Ump: 32.10 U  
Ipm: 4.554 A  
EFF: 7.520%

### Setup



Sampling Time of Datalogging: 1 Minute (0-99 Minute)  
Ir Connection: 0.0 % (-20.0-20.0%)  
Tc Offset: 0.0 °C (-10.0-10.0°C)  
Threshold Value of Sunshine Duration: 120 W/m² (70-380 W/m²)  
Threshold Value of Sunshine: 5 W/m² (1-120 W/m²)

### Power Curves



### Irradiance / Temperature Recording

