Technical data sheet

Secondary Skid Unit (SSU)
Solar Power Collection application

Secondary Skid Unit (SSU)
A Secondary Skid Unit (SSU) is an assembly comprising of MV switchgear and a transformer packaged for power collection in solar generating plants. The SSU is the power collection unit which converts the solar energy generated by the solar panels into a usable grid voltage. The SSU is a plug-and-play solution usually installed as close to the solar strings as possible, enabling solar power to be easily and rapidly connected to the electrical grid.

Features
- Simple and quick installation – pre-test units at the factory, drop in place and connect cables
- Pre-engineered products to reduce time to quote and supply, while reducing risks
- Engineered for efficient cooling in order to extend the life of the equipment
- All ABB designs are green to support the environment
- No exposed live parts, more safe for operator and personnel
- SCADA ready
- All equipment contained in the solar modules are type tested according to their relevant standards
- Easy access to equipment for visual inspection and service
- Open-air cooling for maximum efficiency
- Compact and easily transportable
- Economic solution
- Locking system for MV compartment to prevent unauthorized entry

Transformer
The SSU is designed and manufactured to be installed with liquid filled or dry type transformers. The transformer can be provided with a wide range of options and protection for temperature and gas pressure.

Medium voltage
The SSU can be provided with different options of medium voltage switchgear from ABB's SF6 or air insulated switchgear portfolio. The MV switchgear can be provided with SF6 gas alarm, switch position contacts, plug-in MV surge arresters or auto reclosing functions.

Low voltage
The low voltage protection is included in the inverter equipment. LV cables are directly connected to the transformer LV bushing.

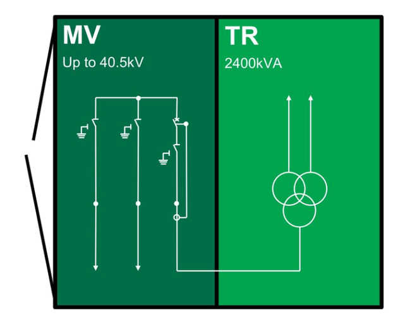
Smart Grid
- Smart grid ready for easy connection to any SCADA system through any standard communication protocols
- Remote Terminal Unit (RTU) to monitor the SSU and store data for operation, maintenance and fault analysis
- Local and remote monitoring commands available
- Smart grid compatibility provides supervision and operation of substations from a central office by utilizing end user communication and infrastructure and ABB Station automation device

Power and productivity for a better world™ ABB

Pre-engineered solution technical data
Pre-designed solutions are available for optimized designs and quicker delivery. Power ratings are aligned with the most common inverter power ratings. The solutions are equipped with medium voltage switchgear SafeRing CCV configuration (cable loop with breaker and relay protection). The transformer includes standard integrated protection for pressure and gas (RIS). Product datasheets are available with an overview of other options available. Pre-designed solutions for Power Collection are shown below:

Style number	SSU-S-1510-0CCV-4000	SSU-S-2410-0CCV-3000	SSU-S-2410-0CCV-4000	SSU-S-2410-0CCV-2000
Enclosure type	Skid	Skid	Skid	Skid
Overall parameters				
Length x Width x Height, mm	3400 x 2550 x 2800	3400 x 2550 x 2800	3400 x 2550 x 2800	3400 x 2550 x 2800
Approximate weight (metric tons)	8	9.5	9	9
MV switchgear				
Switchgear type	SafeRing CCV	SafeRing CCV	SafeRing CCV	SafeRing CCV
Protection Relay	REJ603	REJ603	REJ603	REJ603
Transformer				
Transformer type	oil immersed	oil immersed	oil immersed	oil immersed
Power rating, kVA	1500	2400	2400	2400
LV Voltage level, V	300 to 400	300 to 400	300 to 400	300 to 400
MV Voltage level, kV max	13.8	40.5	13.8	24
Standard protection	RIS	RIS	RIS	RIS

Single line diagram/layout (without inverter)



For more information please contact:

E-Mail: get.ph@ph.abb.com

www.abb.com/mediumvoltage
www.abb.com/medium-voltage/by-customer-segment/solar

General technical data

Nominal output voltage range	6 kV to 40.5 kV
Ambient temperature range	-25 °C to +40 °C
Relative humidity, non-condensing	95%
Max altitude above sea level w/out derating	1000m
Corrosion class (ISO 12944-2)	C5M
IP rating	IP44

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Power and productivity for a better world™ ABB

ARRAY TECHNOLOGIES

RELIABILITY IS POWER.

BOOST PRODUCTION.
BOOST REVENUE.

SmarTrack optimization technology intelligently adjusts module angles in response to weather and site conditions to boost real-world power output.

BACKTRACKING OPTIMIZATION.
Uneven terrain? Hill yes! Undulating sites can introduce shading of modules in the late or early morning hours. SmarTrack monitors power production of the as-built project and utilizes a machine learning algorithm to alleviate the effects of shading by backtracking to optimal angles. Once an operational strategy has been learned for a specific site, power production is boosted on a daily basis.

DIFFUSE LIGHT OPTIMIZATION.
It's not always sunshine and blue skies. Diffuse light conditions caused by cloud cover can rob PV plants of output. SmarTrack employs a machine learning algorithm, site data and sensors to adjust the tracking angle of your array, giving you optimal yield until the clouds disappear.

BIFACIAL & SPLIT-CELL OPTIMIZATION.
Two-faced? You betcha! PV plants equipped with SmarTrack will maximize energy harvest by utilizing custom algorithms which benefit sites configured with split-cell bifacial and monofacial modules.

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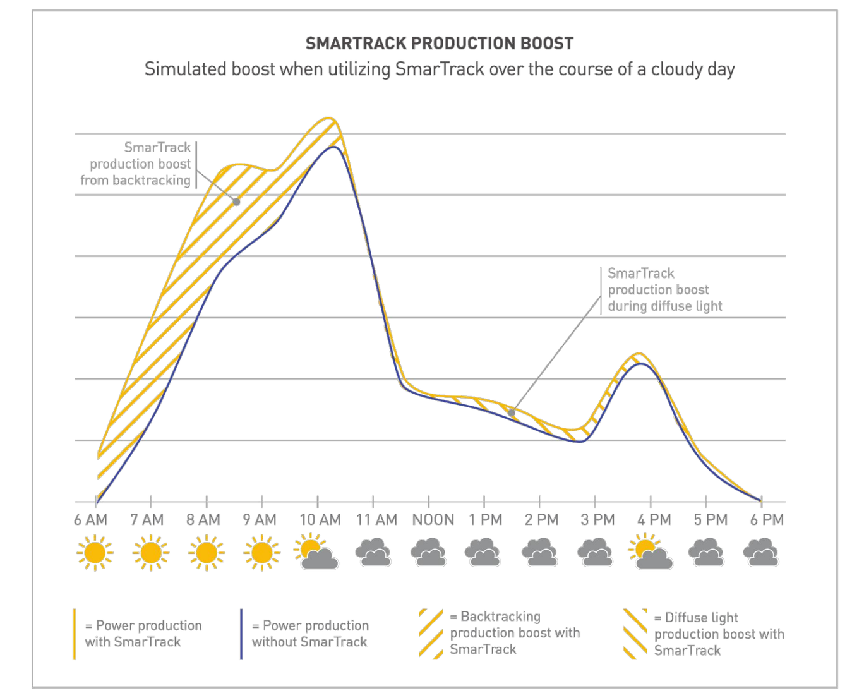
DuraTrack® HZ v3 + SmarTrack™

By combining the world class reliability of DuraTrack® HZ v3 with Array's SmarTrack optimization software you are ensuring maximum production from your PV plant. Real-world sites require real-world assessments. Array's team of trained engineers will work with you to find the optimum configuration based on the unique qualifications of your site.

SmarTrack™

COST VERSUS VALUE
SmarTrack optimization is a cost effective solution which assures you maximize your return on investment by keeping costs and complexity low and energy boost high.

THE GLOBAL LEADER IN RELIABILITY
Array has spent decades designing and perfecting the most reliable tracker on the planet. Fewer moving parts, stronger components and intelligent design that protects your investment in the harshest weather are but a few of the innovative differences that keep your system running flawlessly all day and you resting easy at night.



FEATURES & SPECIFICATIONS

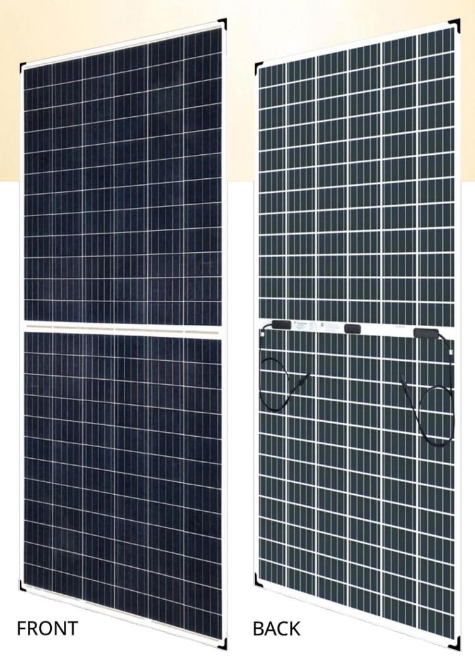
Hardware for Backtracking	Computer and pyranometer used during installation and calibration only
Hardware for Diffuse Light	Pyranometer cluster
Software	Proprietary algorithms
Backtracking Optimization	Fully-automated
Diffuse Optimization	Fully-automated
Calibration	One-time, at commissioning

Array Technologies Inc. reserves the right to make specification changes without notice.

NEW

CanadianSolar

BiKu MODULE
NEW GENERATION BIFACIAL MODULE
FRONT POWER RANGE: 350W ~ 365W
ADDITIONAL BACK POWER OUTPUT UP TO 30%
CS3U-350|355|360|365PB-FG



* Both SBB and MBB modules will be supplied.

MORE POWER
- Up to 30% more energy yield due to back side power generation
- Low NMOT: 42 ± 3 °C. Low temperature coefficient (Pmax): -0.37 % / °C
- Innovative module design, Better shading tolerance

MORE RELIABLE
- Lower internal current, lower hot spot temperature
- Minimizes micro-cracks and prevents snail trails
- Fire Class A and Type 3 / Type 13
- Heavy snow load up to 5400 Pa, wind load up to 2400 Pa *

30 years power output warranty

10 years product warranty on materials and workmanship

MANAGEMENT SYSTEM CERTIFICATES*
ISO 9001:2008 / Quality management system
ISO 14001:2004 / Standards for environmental management system
OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*
IEC 61215 / IEC 61730: VDE / CE
UL 1703: CSA

* If you need specific product certificates, and if module installations are to deviate from our guidance specified in our installation manual, please contact your local Canadian Solar sales and technical representatives.

CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. As a leading PV project developer and manufacturer of solar modules with about 30 GW deployed around the world since 2001, Canadian Solar Inc. is one of the most bankable solar companies worldwide.

*For detailed information, please refer to Installation Manual.

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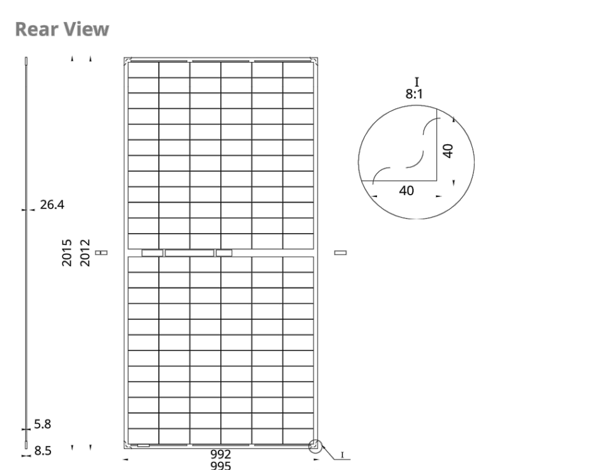
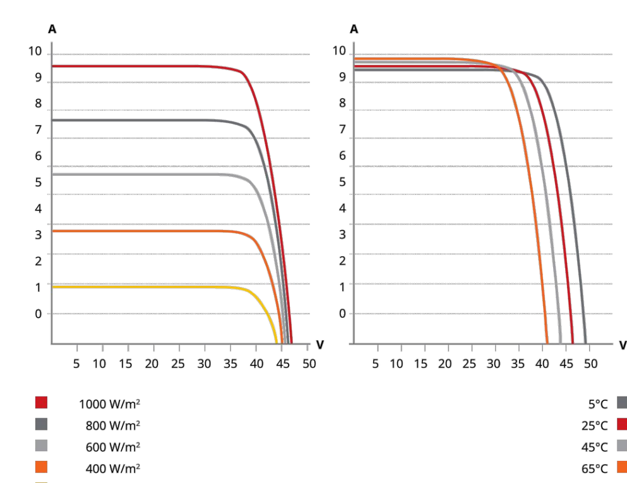
ENGINEERING DRAWING (mm)



CS3U-355PB-FG / I-V CURVES



ELECTRICAL DATA | STC*

		Nominal Max. Power (Pmax)	Opt. Operating Voltage (Vmp)	Opt. Operating Current (Imp)	Open Circuit Voltage (Voc)	Short Circuit Current (Isc)	Module Efficiency
CS3U-350PB-FG		350 W	39.2 V	8.94 A	46.6 V	9.51 A	17.54%
	5%	368 W	39.2 V	9.39 A	46.6 V	9.99 A	18.44%
Bifacial Gain**	10%	385 W	39.2 V	9.83 A	46.6 V	10.46 A	19.29%
	20%	420 W	39.2 V	10.73 A	46.6 V	11.41 A	21.04%
	30%	455 W	39.2 V	11.62 A	46.6 V	12.36 A	22.80%
CS3U-355PB-FG		355 W	39.4 V	9.02 A	46.8 V	9.59 A	17.79%
	5%	373 W	39.4 V	9.47 A	46.8 V	10.07 A	18.69%
Bifacial Gain**	10%	391 W	39.4 V	9.92 A	46.8 V	10.55 A	19.59%
	20%	426 W	39.4 V	10.82 A	46.8 V	11.51 A	21.34%
	30%	462 W	39.4 V	11.73 A	46.8 V	12.47 A	23.15%
CS3U-360PB-FG		360 W	39.6 V	9.1 A	47 V	9.67 A	18.04%
	5%	378 W	39.6 V	9.56 A	47 V	10.15 A	18.94%
Bifacial Gain**	10%	396 W	39.6 V	10.01 A	47 V	10.64 A	19.84%
	20%	432 W	39.6 V	10.92 A	47 V	11.6 A	21.64%
	30%	468 W	39.6 V	11.83 A	47 V	12.57 A	23.45%
CS3U-365PB-FG		365 W	39.8 V	9.17 A	47.2 V	9.75 A	18.29%
	5%	383 W	39.8 V	9.64 A	47.2 V	10.24 A	19.19%
Bifacial Gain**	10%	402 W	39.8 V	10.1 A	47.2 V	10.73 A	20.14%
	20%	438 W	39.8 V	11.02 A	47.2 V	11.7 A	21.94%
	30%	475 W	39.8 V	11.93 A	47.2 V	12.68 A	23.80%

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.
** Bifacial Gain: The additional gain from the back side compared to the power of the front side at the standard test condition. It depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

ELECTRICAL DATA

Operating Temperature	-40°C ~ +85°C
Max. System Voltage	1500 V (IEC) or 1000 V (IEC/UL)
Module Fire Performance	TYPE 3 / Type 13 (UL 1703) or CLASS A (IEC61730)
Max. Series Fuse Rating	20 A
Application Classification	Class A
Power Tolerance	0 ~ + 5 W
Power Bifaciality*	70 %

* Power Bifaciality = $Pmax_{rear}$ / $Pmax_{front}$, both $Pmax_{rear}$ and $Pmax_{front}$ are tested under STC, Bifaciality Tolerance: ± 5 %

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. Canadian Solar Inc. reserves the right to make necessary adjustment to the information described herein at any time without further notice.

ELECTRICAL DATA | NMOT*

	Nominal Max. Power (Pmax)	Opt. Operating Voltage (Vmp)	Opt. Operating Current (Imp)	Open Circuit Voltage (Voc)	Short Circuit Current (Isc)
CS3U-350PB-FG	260 W	36.2 V	7.18 A	43.7 V	7.67 A
CS3U-355PB-FG	264 W	36.4 V	7.25 A	43.9 V	7.74 A
CS3U-360PB-FG	268 W	36.6 V	7.31 A	44.1 V	7.80 A
CS3U-365PB-FG	271 W	36.8 V	7.38 A	44.3 V	7.87 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m² spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

MECHANICAL DATA

Specification	Data
Cell Type	Poly-crystalline
Cell Arrangement	144 [2 x (12 x 6)]
Dimensions	2012 × 992 × 5.8 mm (79.2 × 39.1 × 0.23 in) without J-Box and corner protector
(Incl. corner protector)	2015 × 995 × 8.5 mm (79.3 × 39.2 × 0.33 in) without J-Box
Weight	29.3 kg (64.6 lbs)
Front / Back Glass	2.5 mm heat strengthened glass
Frame	Frameless
J-Box	IP68, 3 diodes
Cable	4.0 mm² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	Portrait: 400 mm (15.7 in) (+) / 200 mm (7.9 in) (-); landscape: 1250 mm (49.2 in); leap-frog connection: 1670 mm (65.7 in)*
Connector	T4 series
Per Pallet	30 pieces
Per Container (40' HQ)	660 pieces

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.37 % / °C
Temperature Coefficient (Voc)	-0.29 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION

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SMA

SUNNY HIGHPOWER PEAK3 125-US / 150-US

Cost effective
- Modular architecture reduces BOS and maximizes system uptime
- Compact design and high power density maximize transportation and logistical efficiency

Maximum flexibility
- Scalable 1,500 VDC building block with best-in-class performance
- Flexible architecture creates scalability while maximizing land usage

Simple install, commissioning
- Ergonomic handling and simple connections enable quick installation
- Centralized commissioning and control with SMA Data Manager

Highly innovative
- SMA Smart Connected reduces O&M costs and simplifies field service
- Powered by award winning ennexOS cross sector energy management platform

SUNNY HIGHPOWER PEAK3 125-US / 150-US
A superior modular solution for utility power plants

The new Sunny Highpower PEAK3 is SMA's latest addition to a comprehensive portfolio of utility solutions. This 1,500 VDC inverter offers high power density in a modular architecture that achieves a cost-optimized solution for utility-scale PV integrators. With fast, simple installation and commissioning, the Sunny Highpower PEAK3 is accelerating the path to energization. SMA has also brought its field-proven Smart Connected technology to the PEAK3, which simplifies O&M and contributes to lower lifetime service costs. The PEAK3 utility system solution is powered by the ennexOS cross-sector energy management platform, 2018 winner of the Intersolar smarter E AWARD.

Technical Data *	Sunny Highpower PEAK3 125-US	Sunny Highpower PEAK3 150-US
Input (DC)		
Maximum array power	187500 Wp STC	225000 Wp STC
Maximum system voltage	1500 VDC	1500 VDC
MPP voltage range	710 V ... 1425 V	855 V ... 1425 V
MPP trackers	1	1
Maximum operating input current	180 A	180 A
Maximum input short-circuit current	325 A	325 A
Output (AC)		
Nominal AC power	125000 W	150000 W
Maximum apparent power	125000 VA	150000 VA
Output phases / line connections	3 / 3-PE	3 / 3-PE
Nominal AC voltage	480 V	600 V
Compatible transformer winding configuration	Wye-grounded	Wye-grounded
Maximum output current	151 A	151 A
Rated grid frequency	60 Hz	60 Hz
Grid frequency / range	50 Hz, 60 Hz / -6 Hz ... +6 Hz	50 Hz, 60 Hz / -6 Hz ... +6 Hz
Power factor at rated power / adjustable displacement	1 / 0.0 leading ... 0.0 lagging	1 / 0.0 leading ... 0.0 lagging
Harmonics (THD)	<3%	<3%
Efficiency		
CEC efficiency (preliminary)	98.5 %	98.5 %
Protection and safety features		
Ground fault monitoring: Riso / Differential current	● / ●	● / ●
DC reverse polarity protection	●	●
AC short circuit protection	●	●
Monitored surge protection (Type 2): DC / AC	● / ●	● / ●
Protection class / overvoltage category (as per UL 840)	I / IV	I / IV
General data		
Device dimensions (W / H / D)	770 / 830 / 444 mm (30.3 / 32.7 / 17.5 in.)	770 / 830 / 444 mm (30.3 / 32.7 / 17.5 in.)
Device weight	85 kg (185 lbs)	85 kg (185 lbs)
Operating temperature range	-25°C ... +60°C (-13°F ... +140°F)	-25°C ... +60°C (-13°F ... +140°F)
Storage temperature range	-40°C ... +70°C (-40°F ... +158°F)	-40°C ... +70°C (-40°F ... +158°F)
Audible noise emission (full power @ 1m and 25°C)	< 65 dB(A)	< 65 dB(A)
Internal consumption at night	< 5 W	< 5 W
Topology	Transformerless	Transformerless
Cooling concept	OptiCool (forced convection, variable speed fans)	OptiCool (forced convection, variable speed fans)
Enclosure protection rating	Type 4X (as per UL 50E)	Type 4X (as per UL 50E)
Maximum permissible relative humidity (non-condensing)	100%	100%
Additional information		
Mounting	Rack mount	Rack mount
DC connection	Terminal lugs - up to 600 kcmil CU/AL	Terminal lugs - up to 600 kcmil CU/AL
AC connection	Screw terminals - up to 300 kcmil CU/AL	Screw terminals - up to 300 kcmil CU/AL
LED indicators (Status/Fault/Communication)	●	●
SMA Speedwire (Ethernet network interface)	● (2 x RJ45 ports)	● (2 x RJ45 ports)
Data protocols: SMA Modbus / SunSpec Modbus / Webconnect	● / ● / ●	● / ● / ●
OptiTrac Global Peak (shade tolerant MPP tracking)	●	●
PID Mitigation Solution	○	○
Integrated Plant Control / Q on Demand 24/7	● / ●	● / ●
Offgrid capable / SMA Fuel Save Controller compatible	● / ●	● / ●
SMA Smart Connected (proactive monitoring and service)	●	●
Certifications (pending as of June 2018)		
Certifications and approvals	UL 1741, UL 1998, IEEE 1547, CAN/CSA-C22.2 No.62109	UL 1741, UL 1998, IEEE 1547, CAN/CSA-C22.2 No.62109
FCC compliance	FCC Part 15, Class A	FCC Part 15, Class A
Grid interconnection standards	UL 1741 SA - CA Rule 21, HECO Rule 14H, PRC-024-02	UL 1741 SA - CA Rule 21, HECO Rule 14H, PRC-024-02
Advanced grid support capabilities	L/HFRT, L/HVRT, Volt-Var, Volt-Watt, Frequency-Watt, Ramp Rate Control, Fixed Power Factor	L/HFRT, L/HVRT, Volt-Var, Volt-Watt, Frequency-Watt, Ramp Rate Control, Fixed Power Factor
Warranty		
Standard	5 years	5 years
Optional extensions	10 / 15 / 20 years	10 / 15 / 20 years
Type designation	SHP 125-US-20	SHP 150-US-20

* Preliminary data as of June 2018 ● Standard features ○ Optional features

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SMA America, LLC

CONCEPTUAL - NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE	BY	CHK	APR

NO.	REVISIONS	DATE	BY	CHK	APR
A	ISSUED FOR REVIEW	XX/XX/2018	EAA	SRA	SRA

AVANGRID RENEWABLES

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FAX 512.342.9708

ENGINEERING RECORD		DATE
DRAWN:	E.AGUIRRE	10/25/18
DESIGNED:	E.AGUIRRE	10/25/18
CHECKED:	S. AKERS	XX/XX/18
APPROVED:	S. AKERS	XX/XX/18

MOHAWK SOLAR PROJECT
EQUIPMENT SPECIFICATIONS

CADFILE: MHS-E-XXX-01.dwg | SCALE: NONE | DWG.NO. MHS-E-XXX-01 | SHEET 1 of 2 | REV A