



RSD Field & Lab Test Report

VER. 1.0 2019/05/17

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RSD Field and Laboratory Test Report

1. Test Purpose

In-depth evaluation of APsmart RSD system's performance through onsite witness tests on 30kW PV system using CPS SCA60kTL string inverter with APs RSD solution integrated.

Further investigation of APsmart RSD system reliability and durability through elevated temperature test and single fault test (SFT) in the laboratory.

2. Test Information

Time:	2019-4-30
Location:	Jiaxing, Zhejiang
RSD Model:	RSD-S-PLC
RSD Version:	REV 1.0
Transmitter Model:	Transmitter-PLC
Transmitter Version:	REV 1.0
Inverter Model:	CPS SCA60KTL-DO/US-480

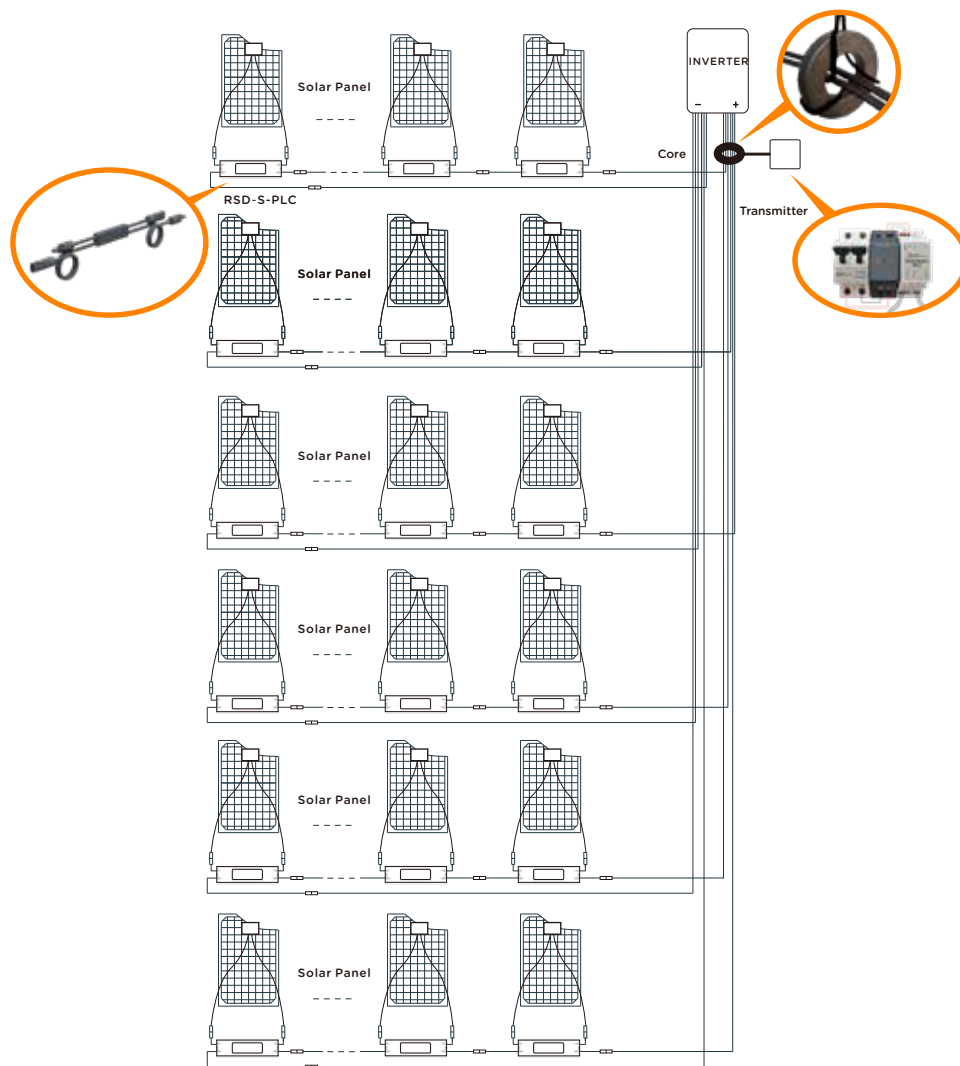
3. Test Introduction

This test had been divided into two parts: field and laboratory, respectively.

3.1 Test System Description

There were 120 PV modules connected by RSD receivers in this 30kW PV system, each 20 PV module group wired in series as one string, with a total of 6 strings in parallel.

The heartbeat signal was coupled by passing PV+ wiring cable through the transmitter core for all 6 strings, detailed connections illustrated in Figure 1.



System Wiring Schematic

Figure 1

3.2 Laboratory Test Description

Laboratory test includes: high temperature accelerated test with feed in current both 15A and 12A, to simulate real time operating conditions.

4. RSD Tests Overview

No	Tests	Test Items	Test Descriptions	Results
1	RSD Functional Tests	PVRSS Turn on	AC turned on: RSD turned on, voltages/power output normal.	PASS
		PVRSS Shut down	System without load: AC shut down, Outside the Array Boundary: 30v/30s, Inside the Array Boundary: 80v/30s.	PASS
			System with load: AC shut down, Outside the Array Boundary: 30v/30s, Inside the Array Boundary: 80v/30s.	PASS
		PVRSS Recover	AC turned on again, system output recovered back to normal.	PASS
		RSD Bypass and recover	Un-plug some receivers from modules in the string will not affected on others operating.	PASS
			Plug-in these receivers, all modules voltage/power output recovered normal.	PASS
2	Interferer Test	Low voltage transmitting	Turn-off Transmitter power supply for 2s then recover, RSD receivers continues operating without stop.	PASS
		PVRSS functionality of 100m length string cable	RSD receivers' startup, shutdown and recover operating normal.	PASS
		PVRSS functionality of 130Khz interfered frequency.	RSD receivers' startup, shutdown, and recover operating normal.	PASS
3	PLC Packet Loss Rate Test	Check Receivers PLC loss packet rate during transmitting.	Replaced by one receiver integrated with monitor module, calculated packets loss rate during transmitting.	PASS
4	Stability Test	RSD system abnormal reboot	RSD system no abnormal reboot during operating.	PASS
		RSD system daily startup /shutdown periods	By comparing module turn on time with its receiver startup time, calculated receiver daily turn on/shutdown period, also monitored reboot abnormal.	PASS
5	High Temperature Test	Temperature rise during output bypassed (15A)	It had enough room within devices tolerances.	PASS
		Temperature rise during normal operation (15A)	It had enough room within devices tolerances.	PASS

5. Test Summary

- a. APsmart RSD solution meet NEC 2017 (690.12) and Sunspec requirements;
- b. RSD system has very strong anti-interference ability;
- c. RSD system has very high reliability, the system startup/ shutdown timing within accepted range;
- d. Under 12A@85°C and 15A@85°C high temperature accelerated tests, the receiver causing operating temperature profile within the datasheet required range for both transmitting and bypassing situations;



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