

Solar Inspection Sample Report



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639-571-2888

Megawatts Solar Farm Aerial PV Inspection Report

COMPREHENSIVE REPORT



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Site Summary

Site Name	Megawatts Solar Farm
Location	Site GPS Location
Address	Site Address
Inspected On	Fri, Nov 18, 2022
Time of Day	10:30 AM Saskatchewan

Results have been quality checked and reviewed for accuracy. Our AI, Human Assisted, Maps software analysis checks for all of the following anomalies: Cell, Cell Multi, Combiner, Cracking, Delamination, Diode, Diode Multi, Hot Spot, Hot Spot Multi, Inverter, Junction Box, Module, Missing Modules, Shadowing, String, Tracker, Reverse Polarity, Vegetation, and Suspected PID. The appendix located at the end of the report includes further descriptions of the found anomalies. All RGB (color) and IR (thermal) imagery has been cross-checked to tag the source of the anomaly.

Site Overview

Company

NAME

Your name

PHONE

639-571-2888

CONTACT

Solar Demo

EMAIL

info@dronethermalinspections.com

Site

POWER

6.384 MWdc

INVERTERSSMA SMA Sunny Highpower
Peak1 SHP75-10 75kW, SMA
SMA SC 500HE-US 500kW**MODULE NAME**Jinko JKM240M 240W, Sunshine
Sunny 240W**MOUNT**

Ground Mount

MODULE TECH

N/A

MODULE LAYOUT

14 modules per string

Data Capture

UAS

M200

IMAGING SYSTEM

XT2

Weather

HUMIDITY

55%

TEMPERATURE

27.49° C

CLOUD COVER

Clear

WIND SPEED

10.55 km/h

Findings

Anomaly	Anomalies ^{*(1)}	Modules ^{*(2)}	Est. Affected DC ^{*(3)}	Est. Affected DC ^{*(4)}	Est. Annual Impact (kWh) ^{*(5)}	Est. Annual Impact (\$) ^{*(6)}
Cell High	1	1	0.08 kW	0.00%	95.19 kWh	\$9.52
Cell Low	22	22	1.76 kW	0.03%	2094.19 kWh	\$209.42
Cell Medium	2	2	0.16 kW	0.00%	190.38 kWh	\$19.04
Cell Multi High	1	1	0.12 kW	0.00%	142.80 kWh	\$14.28
Cell Multi Low	53	53	6.36 kW	0.10%	7568.40 kWh	\$756.84
Cell Multi Medium	9	9	1.08 kW	0.02%	1285.20 kWh	\$128.52
Cracking	73	73	17.52 kW	0.27%	20848.80 kWh	\$2084.88
Damaged	2	2	0.48 kW	0.01%	571.20 kWh	\$57.12
Diode	192	192	15.36 kW	0.24%	18276.57 kWh	\$1827.66
Diode Multi	14	14	2.24 kW	0.04%	2665.61 kWh	\$266.56

Findings

Anomaly	Anomalies ^{*(1)}	Modules ^{*(2)}	Est. Affected DC ^{*(3)}	Est. Affected DC ^{*(4)}	Est. Annual Impact (kWh) ^{*(5)}	Est. Annual Impact (\$) ^{*(6)}
Internal Short Circuit Low	9	9	2.16 kW	0.03%	2570.40 kWh	\$257.04
Internal Short Circuit Medium	3	3	0.72 kW	0.01%	856.80 kWh	\$85.68
Junction Box High	1	1	0.24 kW	0.00%	285.60 kWh	\$28.56
Junction Box Low	1	1	0.24 kW	0.00%	285.60 kWh	\$28.56
Junction Box Medium	1	1	0.24 kW	0.00%	285.60 kWh	\$28.56
Missing	1	1	0.24 kW	0.00%	285.60 kWh	\$28.56
Module	4	4	0.96 kW	0.02%	1142.40 kWh	\$114.24
String	3	42	10.08 kW	0.16%	11995.20 kWh	\$1199.52
Underperforming String	9	126	30.24 kW	0.47%	35985.60 kWh	\$3598.56
Vegetation	39	39	3.12 kW	0.05%	3712.43 kWh	\$371.24

Findings

Anomaly	Anomalies ^{*(1)}	Modules ^{*(2)}	Est. Affected DC ^{*(3)}	Est. Affected DC ^{*(4)}	Est. Annual Impact (kWh) ^{*(5)}	Est. Annual Impact (\$) ^{*(6)}
Totals	440	596	93.40 kW	1.45%	111143.57 kWh	\$11114.36

^{*(1)} Anomalies: The number of instances of a specific anomaly.\

^{*(2)} Modules: The number of modules affected by a specific anomaly.\

^{*(3)} Est. Affected DC (kW): The estimated affected power is determined by multiplying the number of modules affected, the peak power of the solar module at STC, and a power factor ranging from 0 to 1 specific to the anomaly.\

^{*(4)} Est. Affected DC (%): The estimated affected power of the anomaly is divided by the total site's power and represented as a percent.\

^{*(5)} Est. Annual Impact (kWh): The estimated annual impact in kilowatt-hours is the estimated affected power multiplied by the site's peak sunlight hours. The peak sunlight hours can be changed by selecting the "\$ PPA Values" button in the left navigation menu.\

^{*(6)} Est. Annual Impact (\$): The estimated annual impact in money is the estimated annual impact in kilowatt-hours multiplied by the money per kilowatt-hour i.e. power purchase agreement (PPA) rate. The PPA rate can be changed by selecting the "\$ PPA Values" button in the left navigation menu.\

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For more information on each class of anomaly please continue to the appendix to learn more.

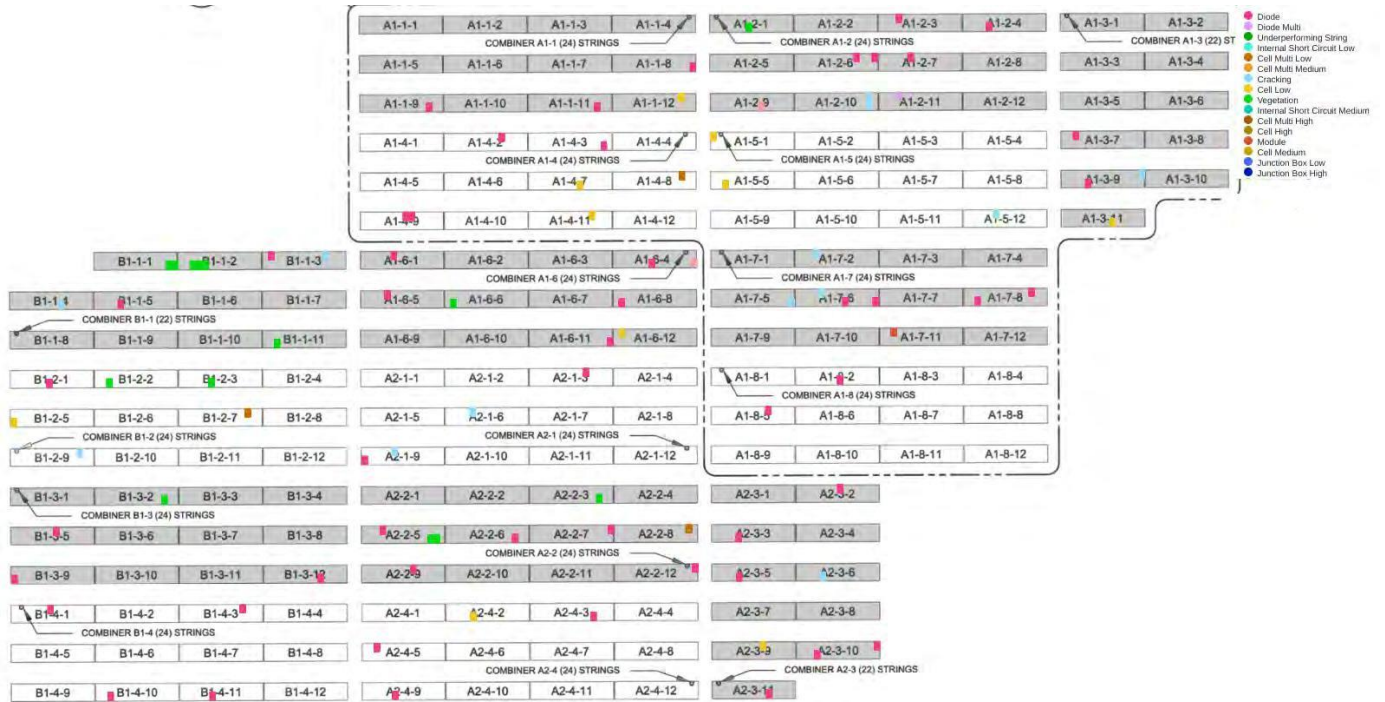
Anomaly Map

Anomaly Map



Anomaly Map

Anomaly Map Part 1



Anomaly Map

Anomaly Map Part 2



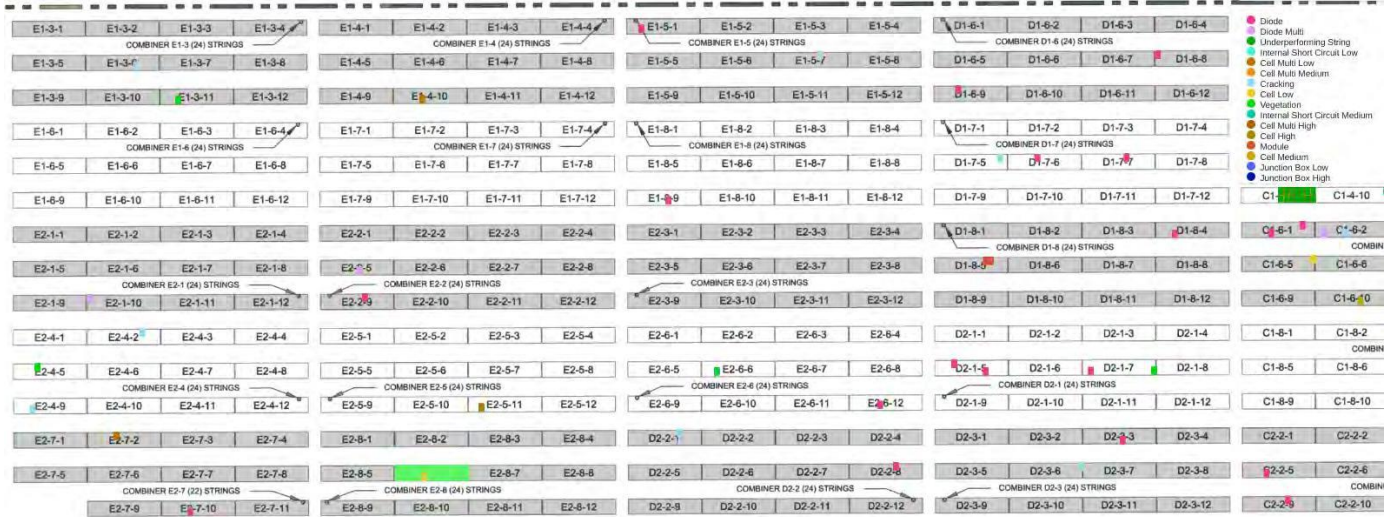
Anomaly Map

Anomaly Map Part 3



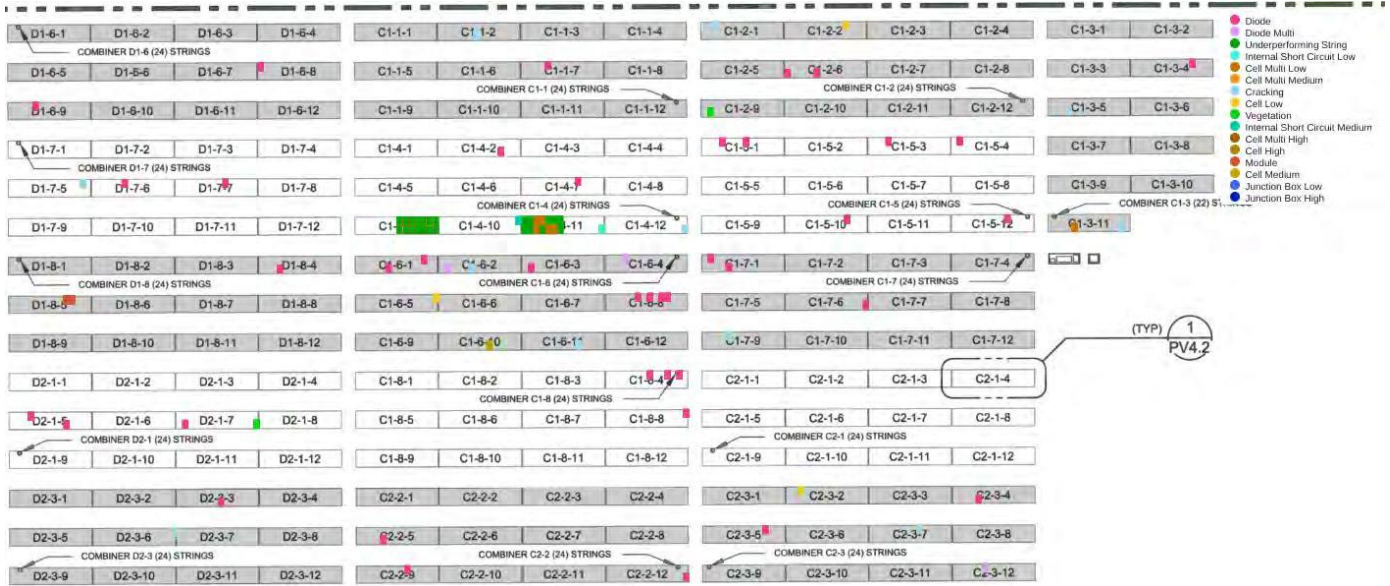
Anomaly Map

Anomaly Map Part 4



Anomaly Map

Anomaly Map Part 5

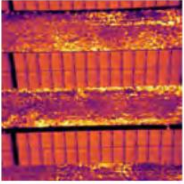
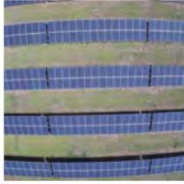
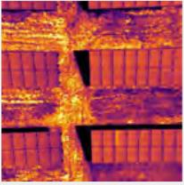
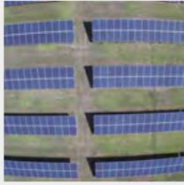
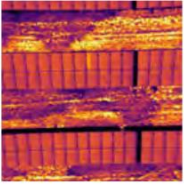
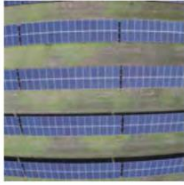
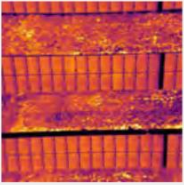

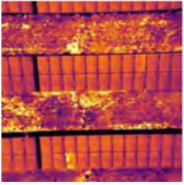
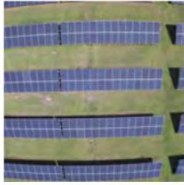


Anomaly Map

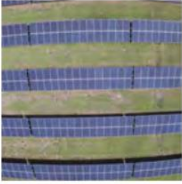
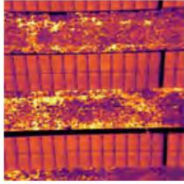
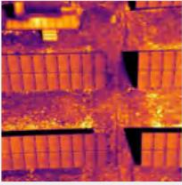

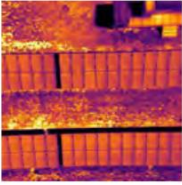

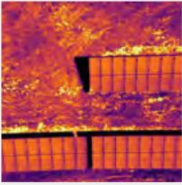
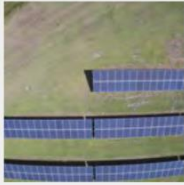
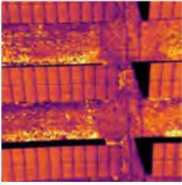

Anomaly Map Part 6




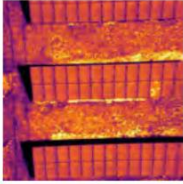
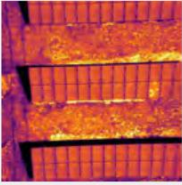

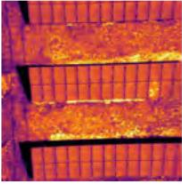
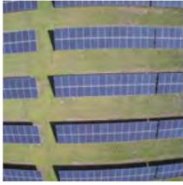
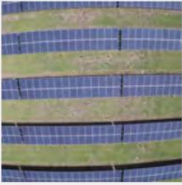
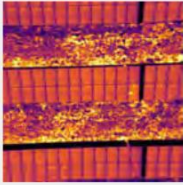
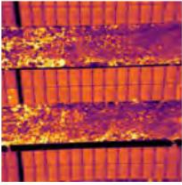
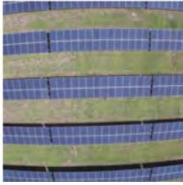
Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Norm. Delta T --	Irradiance --
 DJI_0397_R.JPG	 DJI_0398.jpg	Cell Low	A2.4.2.1.5.2	Low	5.8	864.9
 DJI_0401_R.JPG	 DJI_0402.jpg	Diode	A2.4.5.1.3.1	Medium	4.4	864.9
 DJI_0405_R.JPG	 DJI_0406.jpg	Diode	B1.4.3.2.4.1	Medium	4.0	864.9
 DJI_0411_R.JPG	 DJI_0412.jpg	Diode	B1.4.1.1.7.1	Medium	2.3	864.9
 DJI_0415_R.JPG	 DJI_0416.jpg	Diode	B2.3.4.2.2.1	Medium	3.6	864.9

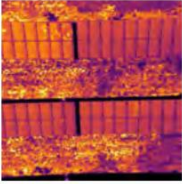
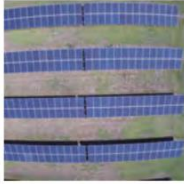
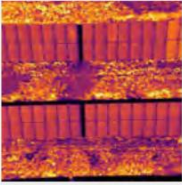
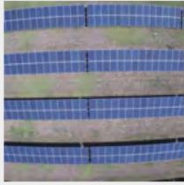
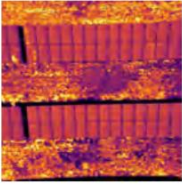
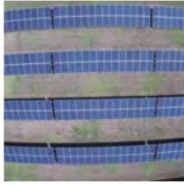
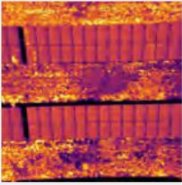

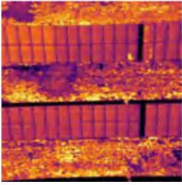
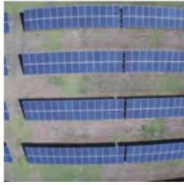
Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Norm. Delta T --	Irradiance --
 DJI_0418.jpg	 DJI_0417_R.JPG	Cracking	B2.3.3.2.3.1	High	3.1	864.9
 DJI_0425_R.JPG	 DJI_0426.jpg	Junction Box High	B2.3.1.1.4.1	None	23.3	864.9
 DJI_0427_R.JPG	 DJI_0428.jpg	Diode	B2.2.3.1.3.2	Medium	5.1	864.9
 DJI_0433_R.JPG	 DJI_0434.jpg	Cell Medium	B2.2.1.1.1.2	Medium	18.0	864.9
 DJI_0455_R.JPG	 DJI_0456.jpg	Cell Low	B2.2.11.2.3.2	Low	8.6	864.9

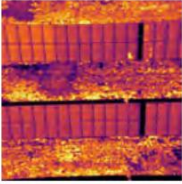
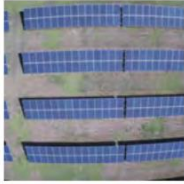
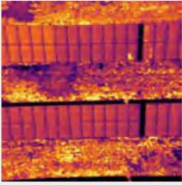
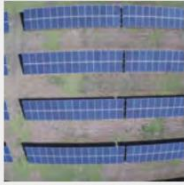
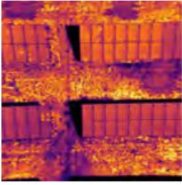

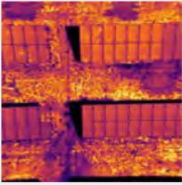

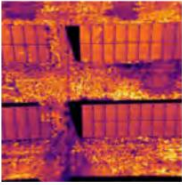

Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Norm. Delta T --	Irradiance --
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 <p>DJI_0457_R.JPG</p>	 <p>DJI_0458.jpg</p>	Diode	B2.5.1.2.6.2	Medium	2.7	864.9
 <p>DJI_0457_R.JPG</p>	 <p>DJI_0458.jpg</p>	Cell Low	B2.5.1.2.1.2	Low	4.1	864.9
 <p>DJI_0462.jpg</p>	 <p>DJI_0461_R.JPG</p>	Cracking	B2.3.10.2.7.2	High	23.2	864.9
 <p>DJI_0463_R.JPG</p>	 <p>DJI_0464.jpg</p>	Diode	B2.3.11.2.7.2	Medium	5.1	864.9

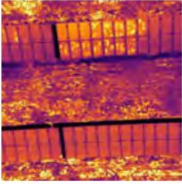
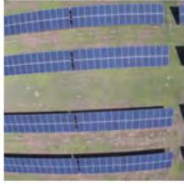
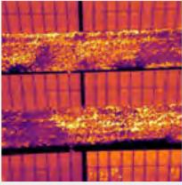
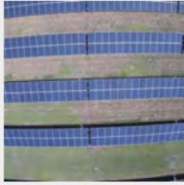
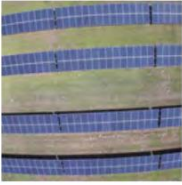
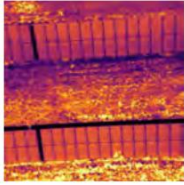

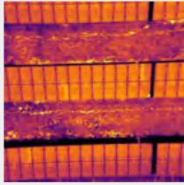

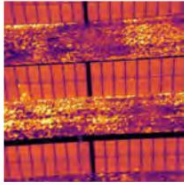
Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Norm. Delta T --	Irradiance --
 DJI_0633_R.JPG	 DJI_0634.jpg	Diode	A2.6.12.1.5.1	Medium	3.6	864.9
 DJI_0637_R.JPG	 DJI_0638.jpg	Diode	A2.6.7.1.3.1	Medium	3.6	864.9
 DJI_0639_R.JPG	 DJI_0640.jpg	Internal Short Circuit Low	A2.6.6.2.7.1	Low	6.1	864.9
 DJI_0639_R.JPG	 DJI_0640.jpg	Diode	A2.6.6.2.4.2	Medium	3.7	864.9
 DJI_0641_R.JPG	 DJI_0642.jpg	Internal Short Circuit Low	A2.6.6.1.1.1	Low	9.8	864.9

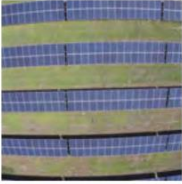
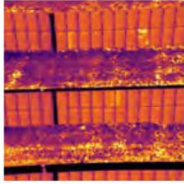
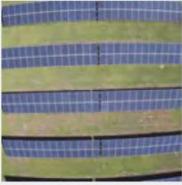
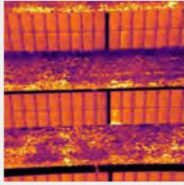
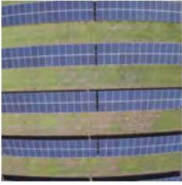
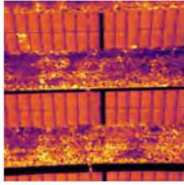
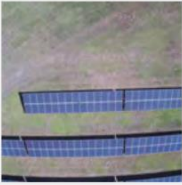
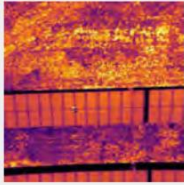

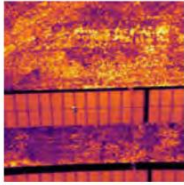
Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority -	Norm. Delta T --	Irradiance -
 DJI_0641_R.JPG	 DJI_0642.jpg	Internal Short A2.6.6.1.1.2 Circuit Low		Low	10.3	864.9
 DJI_0641_R.JPG	 DJI_0642.jpg	Cell Multi Medium	A2.6.5.2.7.2	Medium	16.2	864.9
 DJI_0643_R.JPG	 DJI_0644.jpg	Cell Multi Low	A2.6.5.1.1.1	Low	4.2	864.9
 DJI_0643_R.JPG	 DJI_0644.jpg	Cell Multi Low	A2.6.5.1.2.1	Low	7.3	864.9
 DJI_0643_R.JPG	 DJI_0644.jpg	Cell Multi Low	A2.6.5.1.1.2	Low	8.1	864.9


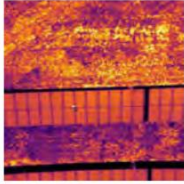
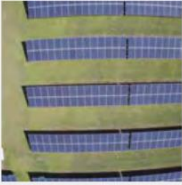
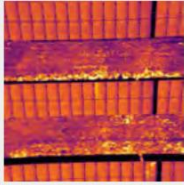
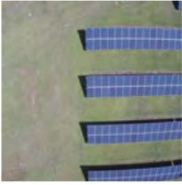
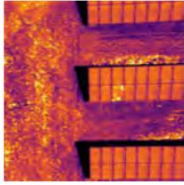
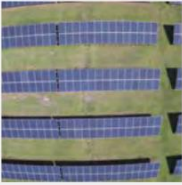
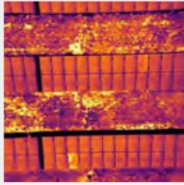
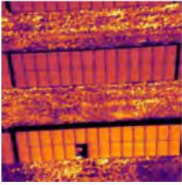
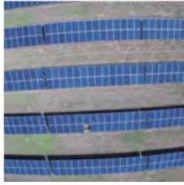
Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Delta T --
 <p>DJI_0004_R.JPG</p>	 <p>DJI_0005.jpg</p>	Underperforming String	D1.5.12.1	Medium	
 <p>DJI_0875_R.JPG</p>	 <p>DJI_0876.jpg</p>	Underperforming String	D1.5.10.1	Medium	
 <p>DJI_0990.jpg</p>		Cracking	C1.1.2.1.7.2	High	DJI_0989_R.JPG
 <p>DJI_0896.jpg</p>		Vegetation	B1.8.5.2.7.2	Low	DJI_0895_R.JPG
 <p>DJI_0119.jpg</p>		Vegetation	E1.3.11.1.4.2	Low	DJI_0118_R.JPG

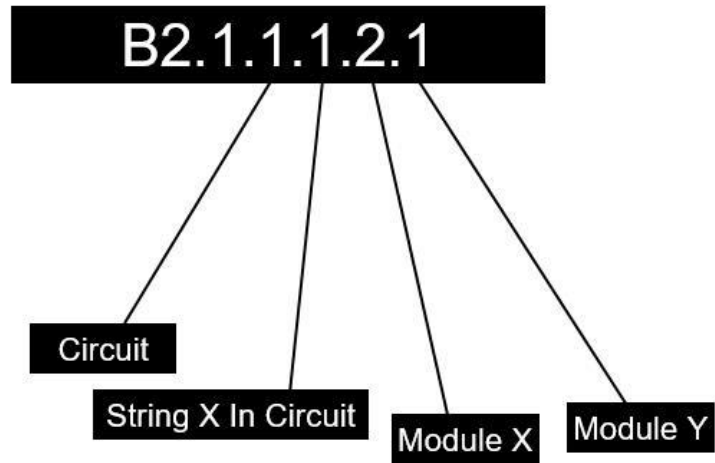
Anomaly Location

Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Delta T --
 DJI_0582.jpg	 DJI_0581_R.JPG	Cracking	B2.4.11.2.1.2	High	
 DJI_0590.jpg	 DJI_0589_R.JPG	Cracking	B2.6.2.1.1.2	High	
 DJI_0584.jpg	 DJI_0583_R.JPG	Vegetation	B2.4.12.1.3.2	Low	
 DJI_0568.jpg	 DJI_0567_R.JPG	Vegetation	D1.1.1.2.1.2	Low	
 DJI_0568.jpg	 DJI_0567_R.JPG	Vegetation	D1.1.1.2.1.1	Low	

Anomaly Location

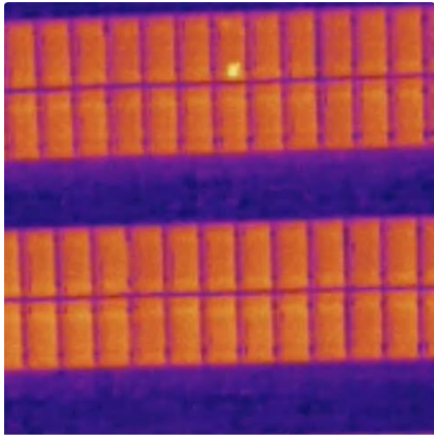
Primary Image	Secondary Image	Tag Name --	Locator --	Priority --	Delta T --
 <p>DJI_0568.jpg</p>	 <p>DJI_0567_R.JPG</p>	Vegetation	D1.1.1.2.2.1	Low	
 <p>DJI_0554.jpg</p>	 <p>DJI_0553_R.JPG</p>	Cracking	B2.4.9.2.7.1	High	
 <p>DJI_0444.jpg</p>	 <p>DJI_0443_R.JPG</p>	Cracking	B2.2.8.1.3.2	High	
 <p>DJI_0416.jpg</p>	 <p>DJI_0415_R.JPG</p>	Cracking	B2.3.8.1.3.2	High	
 <p>DJI_0135_R.JPG</p>	 <p>DJI_0136.jpg</p>	String	E2.8.6.2	High	

Localizing Anomalies



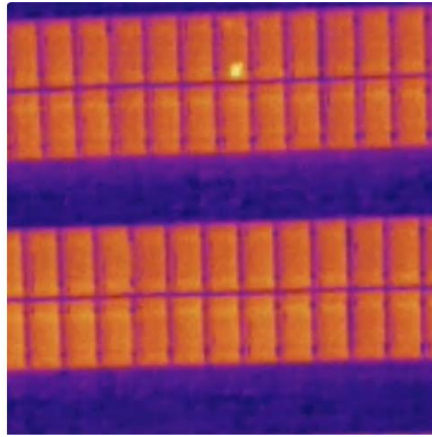
	Module X										String X									
Module Y	1,1	2,1	3,1	4,1	5,1	6,1	7,1	8,1	9,1	10,1	2,1	3,1	4,1	5,1	6,1	7,1	8,1	9,1	10,1	
	1,2	2,2	3,2	4,2	5,2	6,2	7,2	8,2	9,2	10,2	1,2	2,2	3,2	4,2	5,2	6,2	7,2	8,2	9,2	10,2

Example of Anomalies



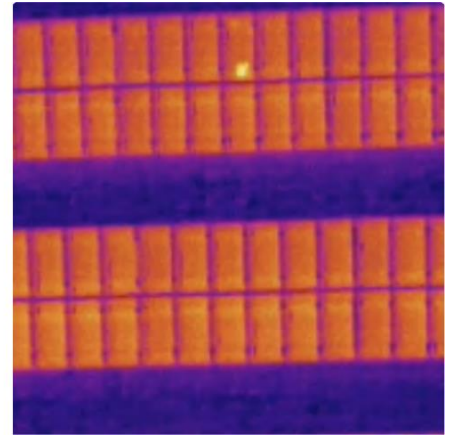
Cell High

Cell anomaly, where the temperature of an anomalous area is 20°C higher than adjacent areas



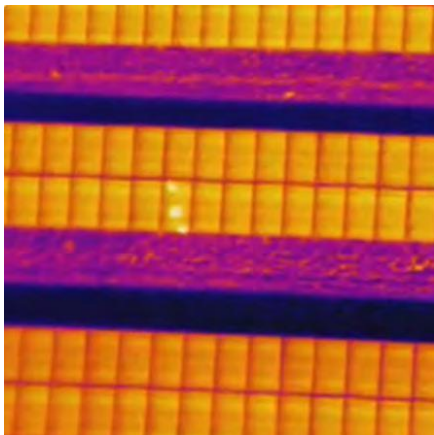
Cell Low

Cell anomaly, where the temperature of an anomalous area is less than 10°C higher than adjacent areas



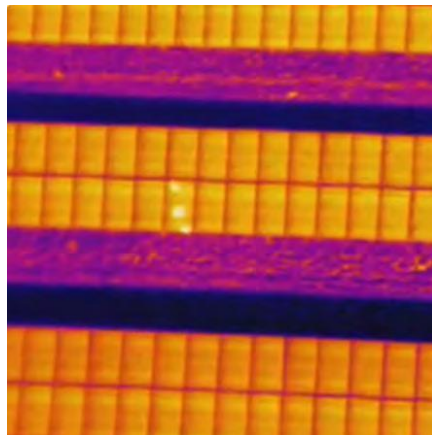
Cell Medium

Cell anomaly, where the temperature of an anomalous area is 10-20°C higher than adjacent areas



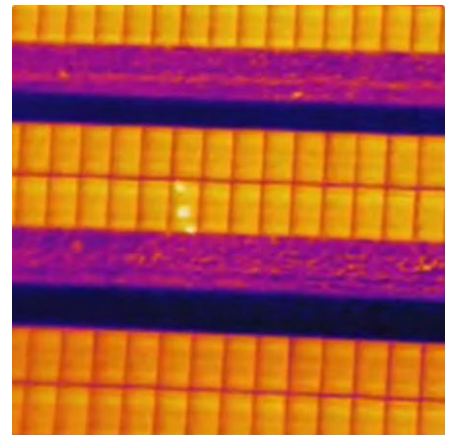
Cell Multi High

Cell multi anomaly, where the temperature of an anomalous area is 20°C higher than adjacent areas



Cell Multi Low

Cell multi anomaly, where the temperature of an anomalous area is less than 10°C higher than adjacent areas



Cell Multi Medium

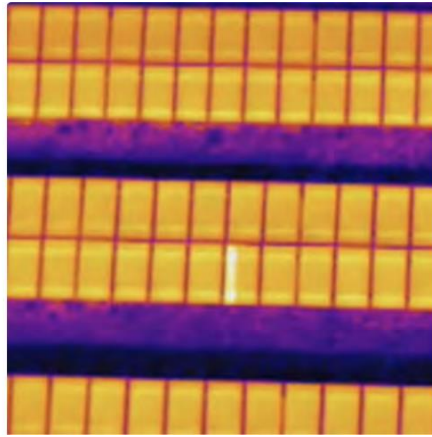
Cell multi anomaly, where the temperature of an anomalous area is 10-20°C higher than adjacent areas

Example of Anomalies



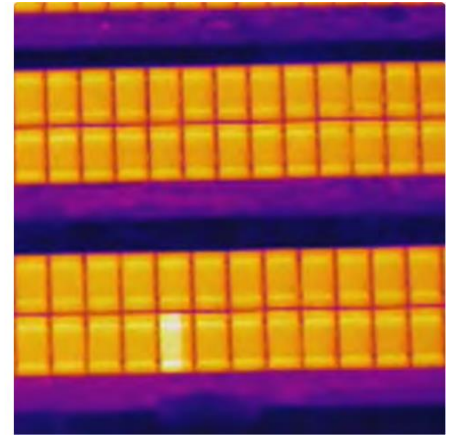
Cracking

Module anomaly caused by cracking on module surface



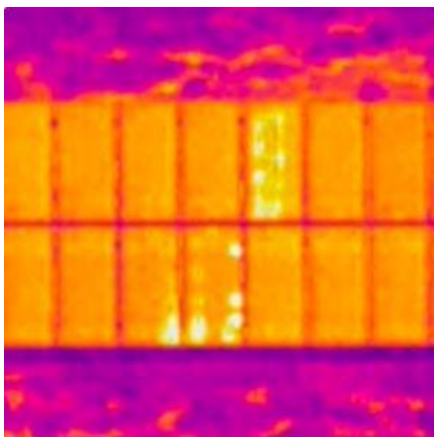
Diode

A bypass diode provides a current path around a faulty cell or module. A diode anomaly indicates an activated bypass diode, typically 1/3 of module.



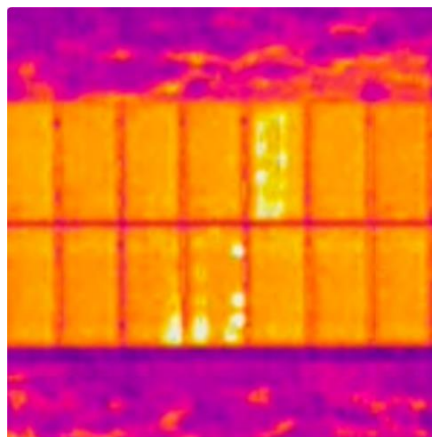
Diode Multi

Multiple activated bypass diodes, typically affecting 2/3 of module



Internal Short Circuit Low

Multiple cell anomalies occurring within the boundaries of a diode(s), where the temperature of an anomalous area is less than 10°C higher than adjacent areas.



Internal Short Circuit Medium

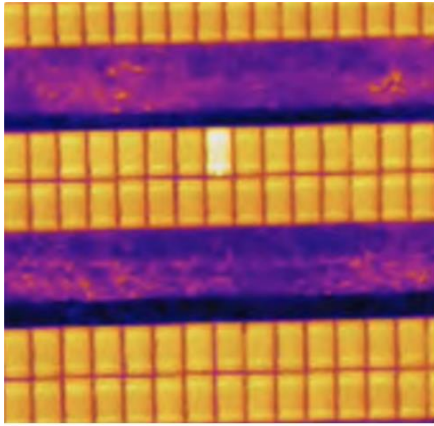
Multiple cell anomalies occurring within the boundaries of a diode(s), where the temperature of an anomalous area is 10-20°C higher than adjacent areas.



Missing

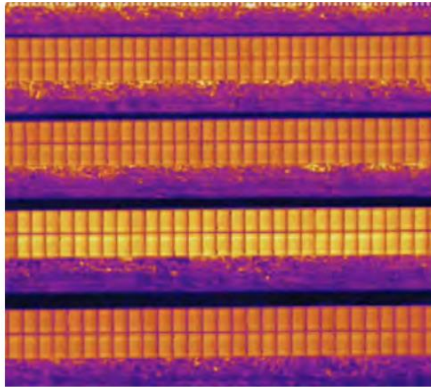
Module is present on as-built but missing from PV system

Example of Anomalies



Module

Entire module is heated



String

A string consists of an individual set of modules connected in series. A string anomaly shows fault in contiguous modules matching the string layout.



Vegetation

Modules blocked by vegetation



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