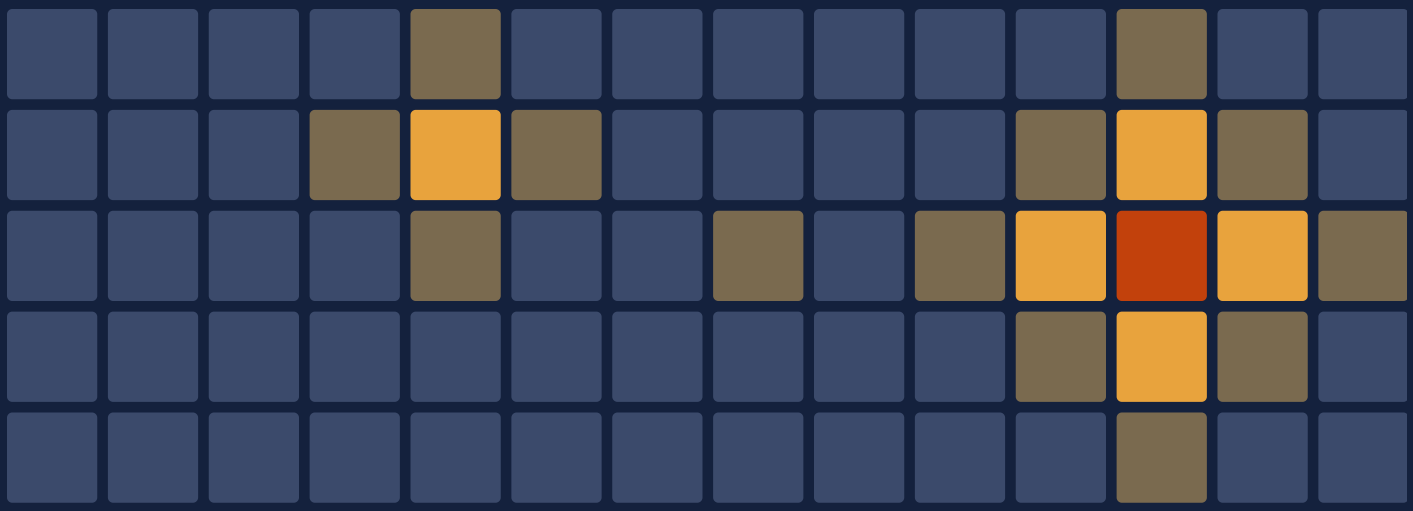


ANNUAL INSPECTION REPORT · IEC TS 62446-3 AERIAL THERMOGRAPHY

Solar Thermal Inspection Report

Sample Site A · single-axis tracker plant · Kern County, California (fictional)

Plant size
20.2 MWdc · 37,440 modules

Inspection date
April 22, 2027 (sample)

Prepared for
[Client O&M operator]

Report
TAI-SOL-SAMPLE-01

Tessera
ASSET INTELLIGENCE

SAMPLE · FICTIONAL SITE · ILLUSTRATIVE DATA

1 · SUMMARY

5 critical findings; most of the lost output sits in three offline strings

64
anomalies found across 37,440 modules

5
critical items for prompt repair

45.4 kW
estimated DC capacity affected (0.22% of plant)

$6,112
estimated annual revenue at risk if left unrepaired

Tessera flew the full plant in one day under clear skies, with plane-of-array irradiance between 815 and 912 W/m², above the 600 W/m² minimum the standard requires. Every anomaly is geolocated to block, string and module position, classified by severity and listed in the register (Section 4) and in the CSV export delivered with this report.

Severity	Count	Typical findings	Suggested response
Critical	5	String offline, broken glass	Repair within 7 days
High	17	Bypass diode active, junction box heating	Repair within 30 days
Elevated	21	Multi-cell and hotter single-cell anomalies	Inspect at next maintenance visit
Watch	21	Mild single-cell anomalies, soiling	Monitor; recheck at next annual scan

Priority actions

- **Restore three non-producing strings** in Blocks 3, 7, 8: about 42.1 kW, most of the capacity affected. Likely causes are blown string fuses or open connectors.
- **Replace two modules with broken glass** for safety and to stop moisture getting in.
- **Check seven modules with an active bypass diode**; a failed diode can overheat the junction box.
- **File warranty claims** for confirmed multi-cell defects; the register gives the evidence the manufacturer asks for.

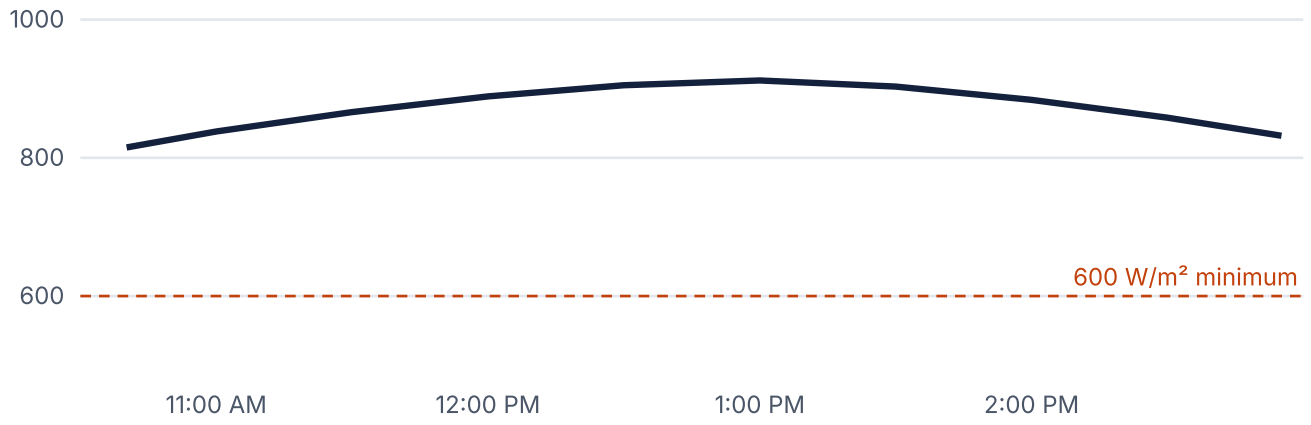
Revenue at risk = affected kW × 2,450 kWh per kW per year (assumed specific yield) × $55/MWh (assumed energy value). Illustrative only.

2 · SCOPE AND CONDITIONS

Flown inside the conditions the standard requires

Item	Detail
Standard	IEC TS 62446-3 (outdoor infrared thermography of PV modules and plants)
Date and window	April 22, 2027, 10:40 AM to 2:55 PM PT (sample)
Irradiance (plane of array)	815 to 912 W/m², logged with a reference cell every minute
Weather	Clear sky; wind 3 to 8 mph; air 68 to 77 °F
Module condition	Last washed 9 days before the flight; light dust only
Plant operation	All inverters online and exporting; trackers in normal tracking
Aircraft and sensors	US-made drone not on the FCC Covered List; radiometric thermal camera (640 × 512) plus RGB camera
Altitude and resolution	About 100 ft above ground; thermal about 1.2 in (3 cm) per pixel, RGB about 0.4 in (1 cm)
Coverage	100% of 37,440 modules in 8 inverter blocks; 2 reflights for cloud shadow

Irradiance during the flight window (W/m²)

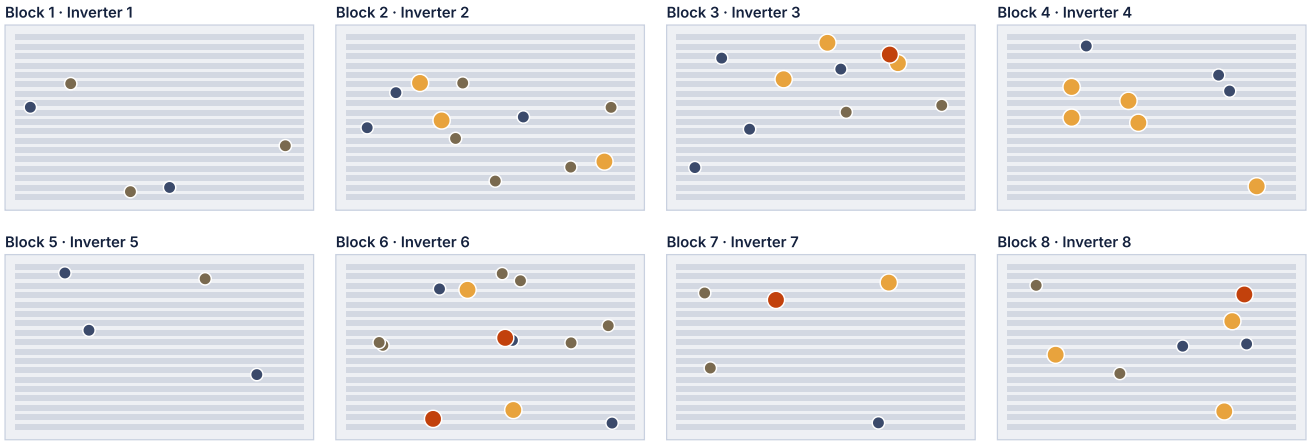


Readings below 600 W/m² void a thermal capture under the standard; none occurred during this window. Cloud-shadowed rows were reflown.

3 · DEFECT MAP

Where the anomalies are

Each dot is one anomaly placed by block and tracker row. The delivered GIS layer (GeoJSON and KML) carries exact coordinates and module IDs for the field crew.



Critical (5) High (17) Elevated (21) Watch (21)

Block	Critical	High	Elevated	Watch	Total
Block 1	0	0	3	2	**5**
Block 2	0	3	5	3	**11**
Block 3	1	3	2	4	**10**
Block 4	0	5	0	3	**8**
Block 5	0	0	1	3	**4**
Block 6	2	2	6	3	**13**
Block 7	1	1	2	1	**5**
Block 8	1	3	2	2	**8**

4 · ANOMALY REGISTER

Highest-priority findings

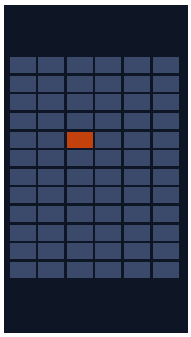
The first 20 of 64 anomalies, sorted by severity. ΔT (°C; multiply by 1.8 for °F) is the temperature difference from the median of comparable cells in the same string, corrected to the logged irradiance. The full register is in the CSV export.

ID	Block	String	Module	Type	ΔT	Severity	Suggested action
A-001	3	3-120	8	String not producing	—	Critical	Check fuse, connectors and combiner input
A-002	8	8-042	22	String not producing	—	Critical	Check fuse, connectors and combiner input
A-003	7	7-132	13	String not producing	—	Critical	Check fuse, connectors and combiner input
A-004	6	6-005	11	Cracked or broken glass	18.5 °C	Critical	Replace module (safety)
A-005	6	6-133	20	Cracked or broken glass	15.2 °C	Critical	Replace module (safety)
A-006	6	6-118	22	Multi-cell hot spot	28.4 °C	High	Inspect module; warranty claim if confirmed
A-007	4	4-008	9	Multi-cell hot spot	27.7 °C	High	Inspect module; warranty claim if confirmed
A-008	7	7-119	13	Multi-cell hot spot	26.4 °C	High	Inspect module; warranty claim if confirmed
A-009	6	6-067	18	Multi-cell hot spot	25.7 °C	High	Inspect module; warranty claim if confirmed
A-010	8	8-046	14	Multi-cell hot spot	25.5 °C	High	Inspect module; warranty claim if confirmed
A-011	4	4-110	3	Junction box heating	24.7 °C	High	Inspect junction box; replace module
A-012	4	4-115	5	Junction box heating	23.9 °C	High	Inspect junction box; replace module
A-013	2	2-170	4	Multi-cell hot spot	23.8 °C	High	Inspect module; warranty claim if confirmed
A-014	8	8-169	12	Multi-cell hot spot	23.8 °C	High	Inspect module; warranty claim if confirmed
A-015	3	3-165	22	Junction box heating	21.8 °C	High	Inspect junction box; replace module
A-016	8	8-144	1	Active bypass diode (substring)	10.6 °C	High	Check diode and wiring; replace module if failed
A-017	2	2-144	2	Active bypass diode (substring)	9.3 °C	High	Check diode and wiring; replace module if failed
A-018	4	4-179	17	Active bypass diode (substring)	8.9 °C	High	Check diode and wiring; replace module if failed
A-019	4	4-178	9	Active bypass diode (substring)	8.7 °C	High	Check diode and wiring; replace module if failed
A-020	3	3-156	1	Active bypass diode (substring)	8.6 °C	High	Check diode and wiring; replace module if failed

5 · EXAMPLE FINDINGS

What the anomalies look like

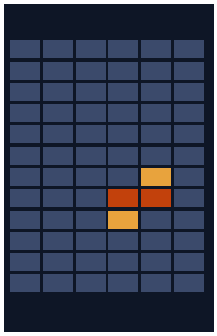
Each finding in the register links to its radiometric thermal image and matching RGB image in the delivered data package. Images below are illustrative.



A-023 · Single hot cell Elevated

A defective or shaded cell running hotter than its neighbors. One cell well above the rest points to a cell defect; watch for growth.

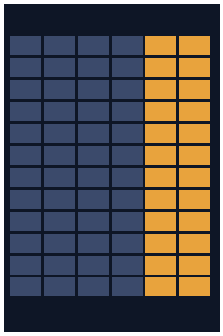
Location	Block 8, string 8-124, module 10
ΔT	17.7 °C (31.9 °F)
Action	Monitor; recheck at next scan



A-006 · Multi-cell hot spot High

Several adjacent hot cells, often from cracked cells or a manufacturing defect. Candidate for a warranty claim.

Location	Block 6, string 6-118, module 22
ΔT	28.4 °C (51.1 °F)
Action	Inspect module; warranty claim if confirmed



A-016 · Active bypass diode High

A whole third of the module runs warm: the bypass diode is carrying current around a damaged substring.

Location	Block 8, string 8-144, module 1
ΔT	10.6 °C (19.1 °F)
Action	Check diode and wiring; replace module if failed

6 · METHOD, CLASSIFICATION AND SIGN-OFF

How the findings were made

Workflow

- Site briefing, airspace check and flight plan by block
- Radiometric and RGB capture with RTK positioning; irradiance, air temperature and wind logged throughout
- Thermal and RGB orthomosaics; automated anomaly detection, then review of every flag by a thermographer
- ΔT measured against comparable cells and normalized to irradiance
- Register, defect map, GIS layers and this report delivered within 5 business days

Deliverables

- This report (PDF)
- Anomaly register (CSV) with coordinates and module IDs
- GIS layers (GeoJSON and KML)
- Thermal and RGB orthomosaics (GeoTIFF)
- Per-anomaly image pairs

Severity classification used in this report

Severity	ΔT (°C)	ΔT (°F)	Also includes
Watch	3 to 10	5 to 18	Soiling or shading patterns
Elevated	10 to 20	18 to 36	—
High	20 to 40	36 to 72	Active bypass diode; junction box heating
Critical	above 40	above 72	String not producing; broken glass; any safety hazard

Thresholds are Tessera's sample defaults. Final thresholds and response times follow the client's O&M agreement and module warranty terms.

Sign-off

Infrared thermographer	[Name], Level 1 thermographer
Remote pilot in command	[Name], FAA Part 107 certificate [number]
Reviewed by	[Name], Tessera Asset Intelligence

Limitations: aerial thermography detects temperature differences at the time of the flight; it does not measure electrical output directly. Findings should be confirmed on the ground before warranty claims or repairs. This sample uses a fictional site and illustrative data.