HARROD DIAGNOSTICS

Solar Thermography Services

harroddiagnostics.co.uk

Invoice

Invoice #2026021401
14 February 2026

Client Info

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Contact No
Address

Contact Info

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Address - 2 Forest Heights, Halton, Lancaster, Lancashire, LA26FG

HARROD DIAGNOSTICS

Solar PV Thermographic Inspection Report

Client:
[N/A]

Site Address:
[N/A]

Inspection Date:
[14/02/2026]

Report Reference:
HD-[2026021401]

Prepared By:
Harrod Diagnostics
Independent solar PV thermographic inspections
IEC TS 62446-3 compliant
Evidence-based diagnostics and clear reporting
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Summary

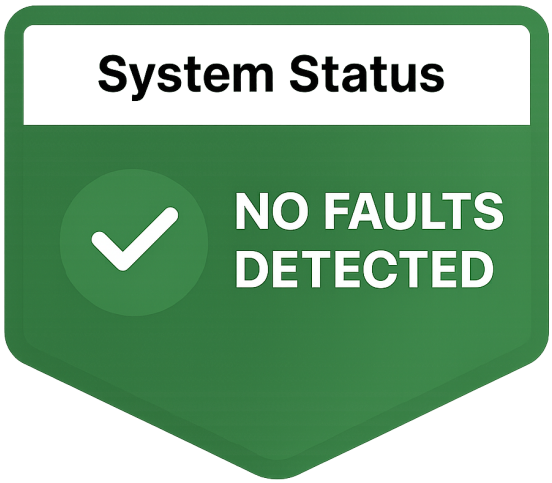
Report Summary

This thermographic inspection provides an evidence-based assessment of the condition and performance of the solar PV system. The survey was conducted in accordance with IEC TS 62446-3, using aerial thermal and RGB imaging to evaluate the array for electrical, thermal, and safety-related abnormalities.

System Status:

No thermal, electrical, or safety-related abnormalities were identified during this inspection. All modules exhibited uniform thermal behaviour under the recorded environmental conditions, and no hotspots, diode patterns, or irregular signatures were observed. The system is operating normally at the time of inspection.

All observations in this summary are supported by thermal and RGB imagery captured during the visit.



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Visit Details

This section documents the conditions and equipment used during the inspection, ensuring full traceability and compliance with IEC TS 62446-3.

Site Information

- Address: N/A
- Client Contact: N/A
- Survey Date & Time: 14/02/2026 11:47:11
- Surveyor: Harrod Diagnostics

Environmental Conditions

Environmental factors directly influence module temperature and thermal contrast. The following conditions were recorded at the time of the survey:

- Ambient temperature - 9.6c
- Wind speed - 2.57 ms (5.75 mph)
- Irradiance level - 669 watts m2
- Sky conditions - Mostly sunny with some high thin cirrus clouds
- Humidity - 50%

Equipment Used

To ensure accuracy and repeatability, the following equipment and settings were used:

- Drone platform - DJI Matrice 4T
- Thermal camera - Integrated 4T module, 640 x 512 resolution, 12mm lens
- Camera settings: - 0.95 emissivity, 9.6c reflected temperature, 5m distance

Compliance Statement

This inspection was conducted in accordance with IEC TS 62446-3, following recommended practices for thermal imaging, environmental thresholds, and anomaly classification.

Irradiance Image

Wind Speed Image

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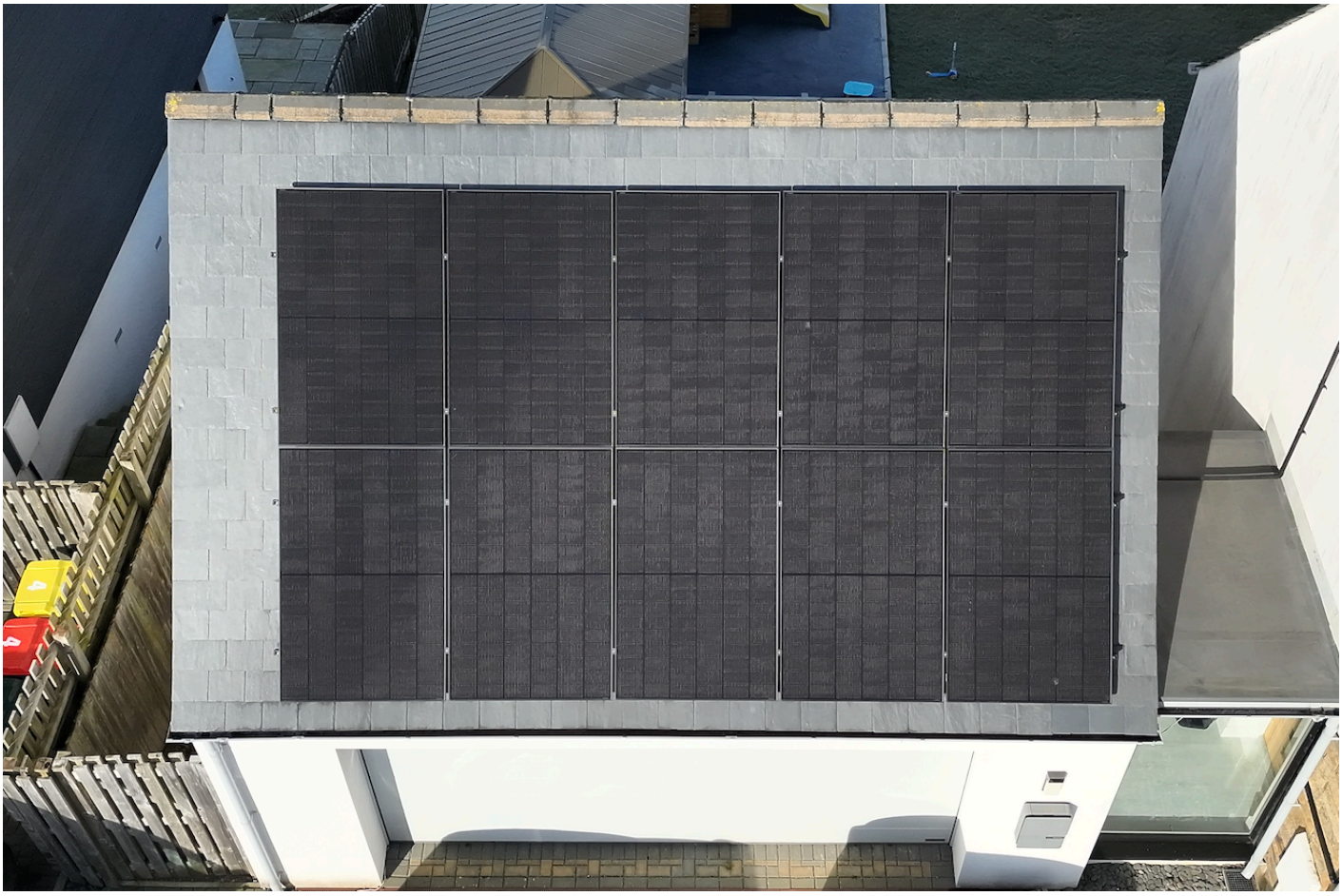
RGB Array Layout



System Location

Layout Overview

This RGB site map provides a verified visual record of the PV array layout at the time of inspection. It documents module orientation, roof geometry, and surrounding features that may influence thermal behaviour. The map is used to correlate thermal findings with module positions, string arrangements, and access points. All anomalies identified in this report are referenced against this layout to ensure clarity, traceability, and accurate location reporting.

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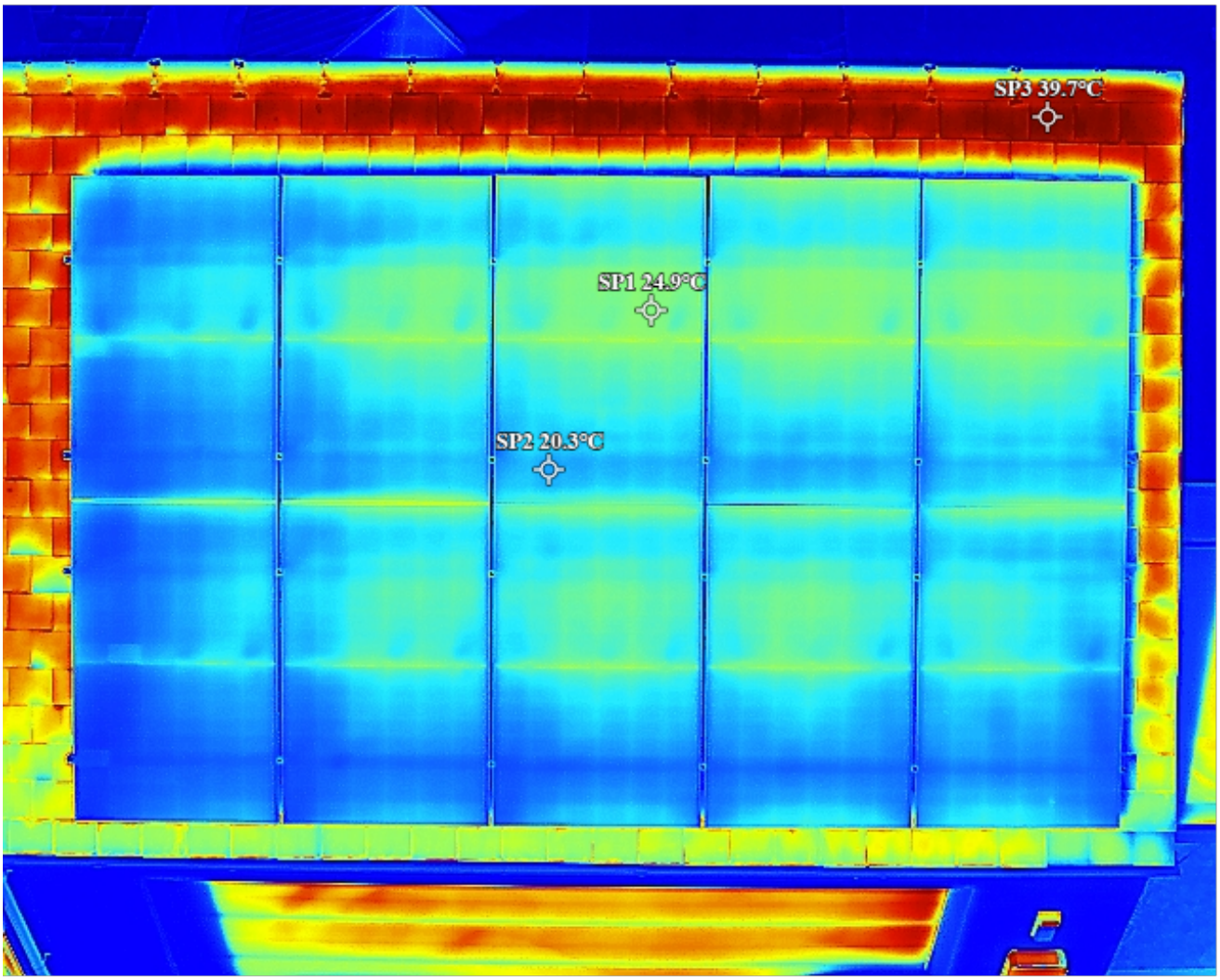
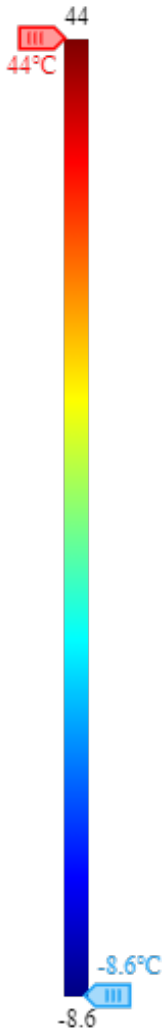
Thermal Array Layout





SP1	VALUE	24.9℃
SP2	VALUE	20.3℃
SP3	VALUE	39.7℃

Distance	5 m
Humidity	50%
Emissivity	0.95
Reflected Temp	9.6℃
Ambient Temp	9.6℃

Model	M4T
Serial Number	1581F7K3C251P00C2QEF
Focal Length	12.0 mm
F-Number	f/1.0
Width	640
Height	512
Created	2026/02/14 11:47:11
Modified	2026/02/17 16:54:08
Coordinates	54.077916, 2.749154

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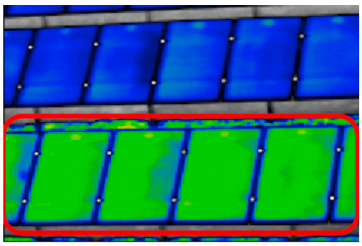
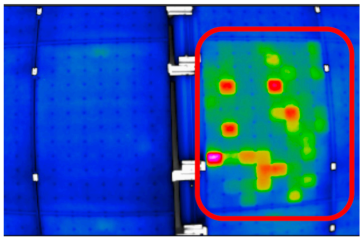
Sample Faults pt1



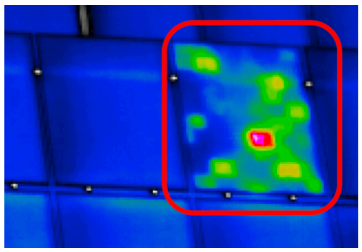
Module in Open Circuit

Summary
The entire module appears evenly warmer than normal because it is not electrically connected to the system. The junction box temperature looks similar to normal operation, which helps distinguish this from diode-related faults.
What it means
The module is not contributing power — it may be disconnected, isolated by the inverter, or affected by an upstream wiring or fuse issue.
Recommended Action
Check the module connections, inverter operating state, and the condition of cabling, connectors, and fuses.



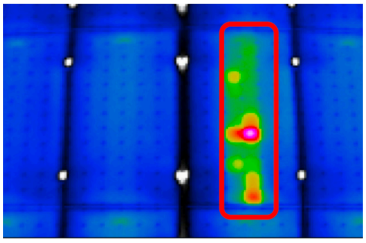
Module in Short Circuit

Summary
The module shows a uniformly elevated temperature pattern similar to several other fault types, including broken glass, PID, cell defects, or mismatch. The thermal signature alone can resemble multiple issues.
What it means
The module is shorted, causing current to bypass normally and generating heat across the surface.
Recommended Action
Inspect the module and associated cabling to confirm the short and identify the source.



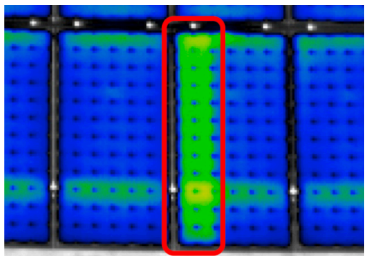
Module with Broken Front Glass (Crystalline Si)

Summary
A module with broken glass can show a range of thermal behaviours — from almost normal in the early weeks to clear hotspots later. The pattern often resembles short-circuit behaviour, PID, or cell defects. Individual broken cells may heat up more noticeably.
What it means
The module has lost isolation resistance, creating a safety risk and making it vulnerable to moisture ingress and electrical faults.
Recommended Action
Handle with caution due to high voltage exposure. Inspect for broken cells, moisture damage, and confirm isolation resistance before any further testing.



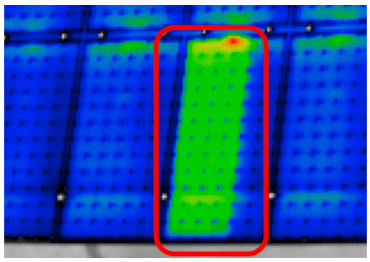
Substring in Short Circuit

Summary
A section of the module runs noticeably hotter than the surrounding area because one substring is effectively shorted. This creates a broad, elevated-temperature region that can look similar to cell cracks, PID, or mismatch issues.
What it means
The module is still operating, but one substring is under abnormal electrical stress.
Recommended Action
Check the module and bypass diodes under reverse-bias conditions to confirm they are functioning correctly.



One Substring in Open Circuit

Summary
One substring has lost electrical continuity, causing the bypass diode to activate. This results in a uniformly warm area on part of the module, with heat often visible around the junction box. In some cases, arcing may occur at a failed connection.
What it means
A connection failure inside the module or junction box is preventing current flow through one substring.
Recommended Action
Inspect the junction box, cell connectors, and bypass diode for disconnection or failure.



Two Substrings in Open Circuit

Summary
Two substrings are disconnected, activating multiple bypass diodes. This produces a larger uniformly warm region and increases the likelihood of internal arcing or diode failure.
What it means
There are multiple internal connection failures, or one or more bypass diodes may not be functioning correctly.
Recommended Action
Investigate for multiple connection losses or bypass diode malfunction within the module or junction box.

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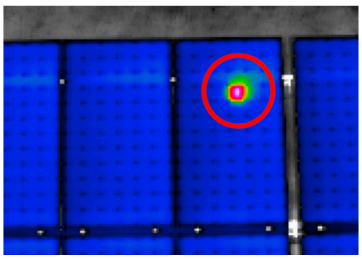
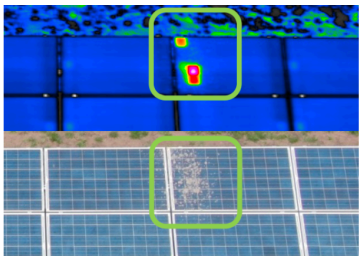
Sample Faults pt2



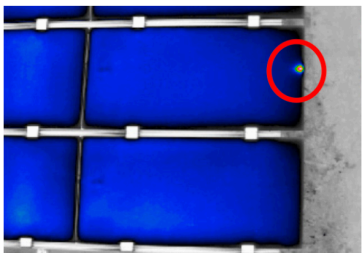
Single Cell With Elevated Temperature

Summary
One cell runs significantly hotter than the others. Mild cases show a moderate temperature rise, while severe cases show very high temperatures. The hotspot becomes more pronounced under higher load.
What it means
This is usually caused by a broken or damaged cell. If left unchecked, it can lead to permanent damage to the cell, encapsulation, or even the bypass diode.
Recommended Action
Ensure the cell isn't being shaded or heavily soiled. If the hotspot persists, further inspection is required.



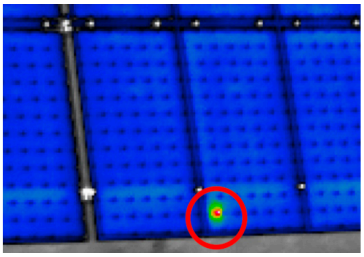
Module With Cells Shaded by Dirt

Summary
Dirt, dust, or bird droppings cause localised heating on the module surface. The severity depends on how much rain the site receives and how long the dirt remains.
What it means
Light, naturally washed dirt is usually harmless. Heavy or persistent soiling in dry climates can cause significant hotspots and long-term damage.
Recommended Action
- Light soiling: No immediate action — rain will typically clean the module.
- Heavy or persistent soiling: Cleaning is recommended soon to prevent damage.



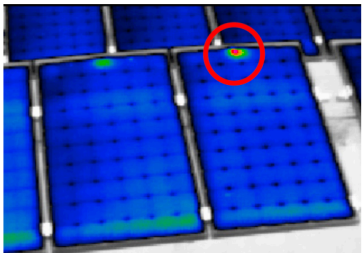
High Transfer Resistance at Cross-Connections (Thin Film)

Summary
A small, intense hotspot appears at a cross-connection point due to increased contact resistance. The hotspot becomes more pronounced under electrical load.
What it means
Poor soldering or degraded contacts are causing resistance heating at a specific point.
Recommended Action
Have the module reviewed by a PV expert to confirm the cause and assess risk.



High Transfer Resistance at Cell Connections (Crystalline Si)

Summary
A point hotspot forms at a cell connection due to poor or missing soldering, a broken ribbon, or a failed joint. The hotspot intensifies with load.
What it means
A connection fault is creating resistance heating at a specific cell-to-ribbon junction.
Recommended Action
A PV expert should inspect the module to confirm the defect and determine whether repair or replacement is needed.



Heated Module Junction Box

Summary
The junction box is noticeably hotter than nearby junction boxes. The hotspot increases with electrical load.
What it means
There may be increased contact resistance inside the junction box, or a bypass diode may be conducting when it shouldn't.
Recommended Action
Have the junction box inspected by a PV expert. Use caution — high voltages may be present.

Inspection Limitations

This inspection is a non-intrusive thermographic assessment carried out in accordance with IEC TS 62446-3. Findings are based solely on thermal and visual signatures observed at the time of the survey. This report is not an electrical safety test and should not be considered a substitute for a qualified electrician's assessment. System conditions may change over time, and no guarantee is made regarding future performance.

Thank you

We appreciate you choosing Harrod Diagnostics for your solar PV thermal survey. Our goal is to provide clear, evidence-based insights that help system owners make confident, informed decisions about their systems.

We believe strongly in giving owners access to technical information that's often difficult to obtain. It matters to us that you fully understand the findings in this report and feel supported in interpreting what the data shows. If you'd like further clarification or guidance on any aspect of the results, we're always here to help.

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