



## CS241DM G2

**Pt-1000 Class A, Precision Back-of-Module Temperature Sensor  
with Digital Modbus RS-485 Output, Second Generation**



## Second- Generation, Modbus, Back- of-Module Temperature Sensor

### Overview

The CS241DM G2 is the second generation of CS241DM, a digital Modbus version of our [CS241 Pt-1000 Class A, Back-of-Module Temperature Sensor](#). This updated sensor features the same best-in-class, surface-mountable temperature sensor with features optimized for bifacial photovoltaic (PV) module performance assessment and soiling. The G2 provides the same measurement accuracy with industrial IEC Class 4 surge protection as its predecessor.

The major change is in the pin layout of the G2's five-pin M12 connector. The new pin assignment conveniently allows you to daisy-chain all Campbell Scientific-recommended sensors installed on a PV string. This improves and simplifies the network topology and reduces cabling costs. We have expanded the operating temperature range, making the sensor suitable for even colder climates. The best part is that all these new features come at no additional cost.

We supply every CS241DM G2 with a NIST-traceable, serialized calibration certificate to meet the performance validation requirements .

### Benefits and Features

- › Meets or exceeds IEC 61724 Class A performance specifications
- › Enables daisy-chain topology with the SunSentry and ISP10
- › Shielded cable from sensor head to the electronics housing for Class A RF immunity
- › Rugged, molded material with operating temperature range of -50° to +150°C
- › Digital Modbus output on RS-485
- › Redesigned for optimal performance on bifacial PV module
- › Easy installation with maximum sensor-to-module bonding strength and smaller profile
- › NIST-traceable, serialized calibration certificate supplied with every sensor
- › Precision Pt-1000 Class A sensing element
- › Compliant with IEC 60751, DIN EN 60751 (formerly known as IEC 751)
- › IP68 rating, making sensor suitable for use on floating PV arrays
- › Slim design to minimize sensor impact on bifaciality (<2% of full-size cell area)
- › Thermal conductance greater than 600 W/(m<sup>2</sup>\*K)
- › Internal four-wire measurement with 24-bit A/D and precision resistor to maximize measurement accuracy



Detailed Description

The CS241DM G2 provides PV stakeholders with the most accurate back-of-module temperature, even at long cable lengths, for use in solar PV module power assessment and soiling. Back-of-module temperature is critical for evaluating effective irradiance, soiling, and power conversion, making the G2—which can collect this data—a vital part of any PV performance monitoring system.

The CS241DM G2 consists of a Pt-1000 Class A platinum resistance thermometer (PRT) encased in a specially designed, slim-profile, low-mass aluminum disk. The slim design minimizes sensor impact on bifaciality with less than two percent area coverage on a full-sized cell. The disk shields the PRT from rapid temperature fluctuations while protecting the fragile PRT element during installation. It minimizes heat transfer, which eliminates surface cooling and results in the highest accuracy in measuring, without impacting the temperature of the solar module. The extremely strong disk adhesive has notable thermal properties, including a thermal conductance greater than 600 W/(m2\*K). These properties eliminate the need for high-temperature epoxy or tape for additional sensor-to-module bonding, making the installation much easier.

The CS241DM G2 cable has been upgraded to a thin, PFA-jacketed, shielded cable. This upgrade offers the following distinct advantages:

- 1. The thin diameter is small enough to fit between the cells of a bifacial module, eliminating any module shading due to cabling.
- 2. The PFA jacket allows for a higher maximum temperature rating of 150°C. The cable includes a quick sensor head connection that is 0.91 m (3 ft) from the sensor head to allow for easier installation and sensor head replacement.
- 3. The shield allows for a Class A RF immunity for the sensor's measurements. The measurements will remain within the specifications during a burst of RF noise.

Combining the highest-quality components and thoughtful, coherent CS241DM G2 sensor design results in the highest back-of-module temperature sensor performance. The CS241DM G2 sensor meets or exceeds the thermal properties, accuracy, and uncertainty specifications defined by IEC 61724 for Class A performance and is compliant with IEC 60751, DIN EN 60751 (formerly known as IEC 751).

Specifications

Sensor	Precision 1,000 ohm Class A platinum sensing element (Pt-1000)
Operating Temperature Range	-50° to +150°C
Class A PRT Accuracy	±(0.15 + 0.002T)°C
Temperature Coefficient	TCR = 3,850 ppm/K
Long-Term Stability	Maximum R <sub>0</sub> drift 0.04% (after 1,000 h at 400°C)
Measuring Current	0.1 to 0.3 mA
Uncertainty	The temperature uncertainty is ±0.3° to 0.4°C in the measurement range of -40° to +150°C.
Disk Material	Anodized aluminum
Disk Diameter	2.54 cm (1.0 in.)
Height	0.419 cm (0.165 in.)
Weight	~27 g (0.06 lb) with connector and 1 m (3 ft) cable

Sensor Cable	
Jacket Material	Black semi-gloss PFA, shielded
Minimum Bend Radius	6 mm (0.25 in.) at least 6 mm (0.25 in.) away from sensor disk
Cable Diameter	0.216 cm (0.085 in.)
Cable Length	0.9144 m (3 ft)
Compliance	
-NOTE-	Compliance information can be found in the Documents section of the web page.
Approvals	» CSA AWM 600 V 105°C FTI » UL AWM 2586 1,000 V 105°C
EMC Compliance	Conforms to Electromagnetic Compatibility Directive (EMC)
RoHS2	Conforms to the Restriction of Hazardous Substances Directive (RoHS2)
Industry Approvals	Compliant with IEC 60751, DIN EN 60751, Industrial Design (IEC Class 4) (formerly known as IEC 751)



IP Rating

IP68 rating (self-certified): 1 m

submersion for 90 min

