

| PVAF-T SERIES

Arc Fault Detection for Solar Applications

Introduction

In the course of normal operation, high voltage PV systems experience severe environments, thermal expansion, and potentially lingering issues from improper installation. These items contribute to the possibility of a fire due to arcing events. To mitigate this, article 690.11 of the 2011 and 2014 NEC mandates listed arc fault protection on all PV systems with a maximum voltage of 80VDC or more operating on buildings.



Sensata's PVAF-T arc fault detector is an integrated arc detection solution which is appropriate for NEC 2011 and 2014 compliant equipment. By building on Sensata's experience in aerospace arc fault technology, Sensata has developed one of the first UL 1699B recognized arc fault detectors for the solar PV industry. Sensata's PVAF-T arc fault detection solutions offer this capability at an economical price point.

Sensata's PVAF-T includes an on-board CT for each combined line in an inverter or combiner box. Up to two 40A combined lines can be monitored concurrently on one PVAF-T board, enough to monitor all the PV sources on typical string inverters up to about 30kW. If an arc is found, a signal is sent via an open collector transistor to the string control circuitry of the inverter or combiner box. The on board LED provides a quick visual indication of which strings the PVAF-T has detected an arc on.

Features

- Monitor up to two 40A max each combined lines (1000V max, 80A total) per PVAF-T arc fault detector
- Self test feature provides verification of unit functionality
- Compact size simplifies system integration
- Conformal coated PCB protects from environmental contaminants
- Single interface connection eases harness management
- On Board LED provides quick visual indication of power ON/OFF and any detected arcing
- Open-collector output electrically indicates fault and can remotely trip breaker or contactor
- Designed for use on systems without DC optimizers
- UL1699B (type 1) recognition

Advantages

- Proprietary algorithm minimizes nuisance trips on most system topographies, reducing downtime and costly manual intervention
- Applicable to products for new installations and retrofits
- Tested with a variety of string and central inverters
- PVAF's UL recognition does not require additional arc testing during UL listing



SPECIFICATIONS

Required External Power Supply	11.4VDC to 25.2VDC range, 20 mA maximum
Number of CT's per PVAF board	Up to 2 CT's
CT Amperage Rating	Up to 40A max per CT
Max Line Voltage	1000VDC
Insulation	> 3000VDC
Compliance & Approvals	UL1699B (Type 1), UL1998 recognized, UL50 (type 1) enclosure, RoHS compliant (lead-free)
Storage & Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Mounting	35mm DIN rail
Mass	140 grams (5.0 oz)

Self Test Feature

As required by UL, a self test feature is provided on every unit. The self test interface (PIN 4) provides the user the ability to send an electrical signal to the PVAF-T to simulate an arc fault condition in the system. The PVAF-T will perform a self test when the signal is low (short) for a minimum of 10ms. Note: a latching reset is required to restore the PVAF-T and the system to proper working function.

Open Collector Output

The PVAF-T provides a signal to the user indicating that there is an arc fault condition present. During normal operating conditions, this signal is low (short). When an arc fault is detected or an AFD fault is registered, this signal changes to high (open).

Visual Indicator (Green LED)



A blinking green light means system is working properly to detect arc fault.



A solid green light means an arc fault has been detected and the system needs attention.



No light means there is an issue with the power reaching the PVAF-T from the external power supply.

Latching Reset

When the PVAF-T detects an arc fault, the unit is latched in the arc fault state. Once the arc fault situation has been resolved, the PVAF-T needs to have the latching function reset. This is accomplished by cycling the external power supply OFF and ON again. Turning the power OFF and ON resets the PVAF-T to its normal arc fault monitoring functionality.

Connector Terminations (Pins)



Pin 4 - Self test IN (reference to ground)

Pin 3 - Arcing detect OUT (reference to ground)

Pin 2 - Ground

Pin 1 - Power (+11.4VDC to +25.2VDC)
(Pin 1 indicated by circular indent in the case)

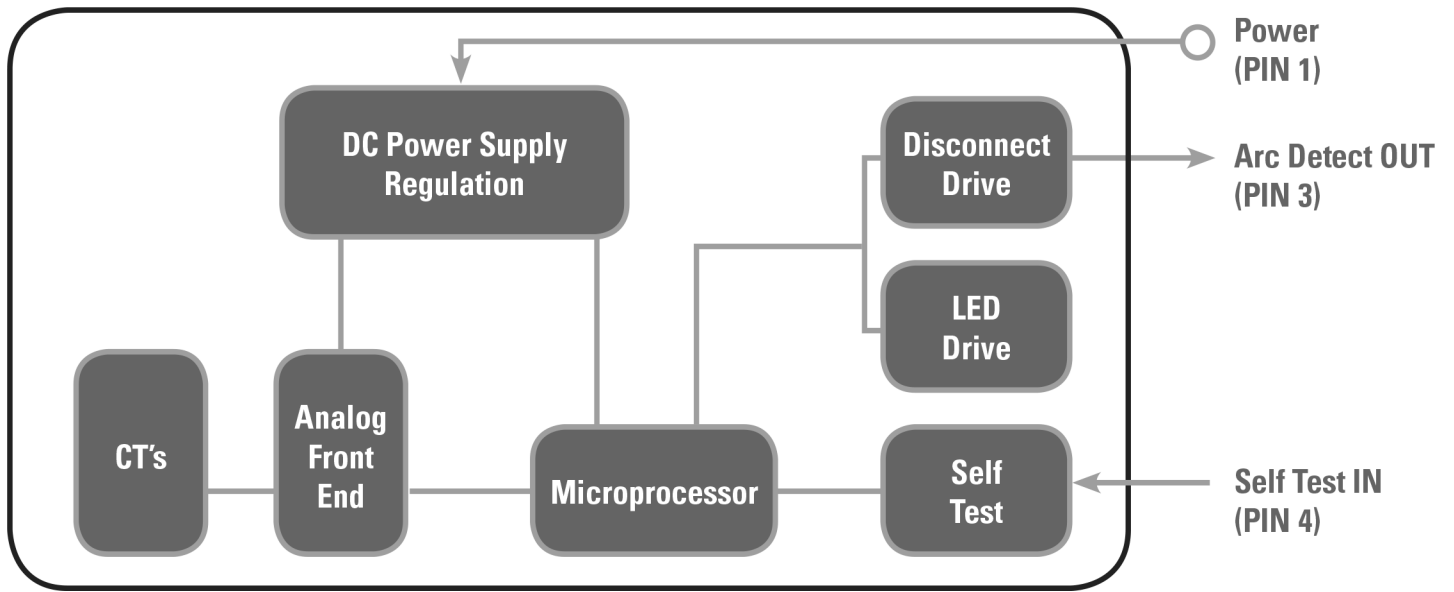
UL1699B Type 1 Recognition

As described in UL1699B Edition 2 (2013), there are two types of UL 1699B recognition: Type 1 and Type 2. UL 1699B Type 1 recognition requires that the arc fault detector (AFD) detect a class of series faults. It also allows that the AFD may detect a class of parallel faults. UL 1699B Type 2 recognition requires detection of both a class of series and a class of parallel faults. Neither Type 1 nor Type 2 recognized AFD's are required to distinguish between parallel or series faults. UL 1699B only requires that the AFD detect an arc of 300 W or more in conditions defined in the standard.

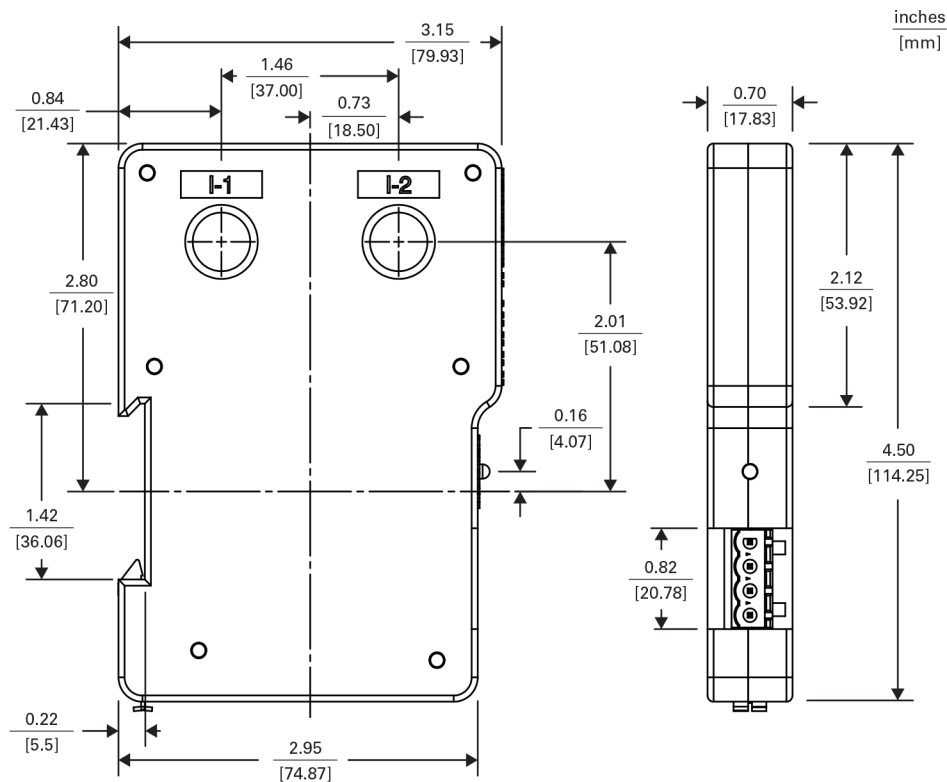
Sensata's PVAF-T AFD has UL 1699B Type 1 recognition only. As such, it detects a class of series faults. The PVAF-T also detects a class of parallel faults, but it does not distinguish whether a specific fault is a series or parallel fault. System designers using the PVAF-T should incorporate appropriate system responses for both series and parallel faults in their designs. System designers should also read the UL 1699B standard to fully understand the differences and capabilities of Type 1 and Type 2 AFD's before designing an arc fault interruption system including any UL 1699B recognized AFD.



BLOCK DIAGRAM



DIMENSIONAL DRAWINGS





ORDERING OPTIONS

Example : PVAF-T2-40B24-001

	PVAF-T	T2	-	40	B	24	-	001
Family								
PVAF-T								
CT's								
2 = 2 CT's								
Amperage								
40 = 40 amps								
Housing								
B = Enclosure with DIN rail mount								
Voltage								
24 = 12VDC/24VDC								
Special Configurations								
000 = None								
001 = Revised								
Call Sensata to discuss special configurations for your application								



AGENCY APPROVALS & CERTIFICATIONS



UL1699B (Type 1), UL1998 recognized, UL50 (type 1) enclosure



RoHS compliant (lead-free)

Revised 4/11/18

Sensata Technologies, Inc. ("Sensata") data sheets are solely intended to assist designers ("Buyers") who are developing systems that incorporate Sensata products (also referred to herein as "components"). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer's systems and products. Sensata data sheets have been created using standard laboratory conditions and engineering practices. Sensata has not conducted any testing other than that specifically described in the published documentation for a particular data sheet. Sensata may make corrections, enhancements, improvements and other changes to its data sheets or components without notice.

Buyers are authorized to use Sensata data sheets with the Sensata component(s) identified in each particular data sheet. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER SENSATA INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN. SENSATA DATA SHEETS ARE PROVIDED "AS IS". SENSATA MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE DATA SHEETS OR USE OF THE DATA SHEETS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. SENSATA DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO SENSATA DATA SHEETS OR USE THEREOF.

All products are sold subject to Sensata's terms and conditions of sale supplied at www.sensata.com SENSATA ASSUMES NO LIABILITY FOR APPLICATIONS ASSISTANCE OR THE DESIGN OF BUYERS' PRODUCTS. BUYER ACKNOWLEDGES AND AGREES THAT IT IS SOLELY RESPONSIBLE FOR COMPLIANCE WITH ALL LEGAL, REGULATORY AND SAFETY-RELATED REQUIREMENTS CONCERNING ITS PRODUCTS, AND ANY USE OF SENSATA COMPONENTS IN ITS APPLICATIONS, NOTWITHSTANDING ANY APPLICATIONS-RELATED INFORMATION OR SUPPORT THAT MAY BE PROVIDED BY SENSATA.

Mailing Address: Sensata Technologies, Inc., 529 Pleasant Street, Attleboro, MA 02703, USA.

CONTACT US

Americas

508-236-2550
power-controls-sales@sensata.com

Europe, Middle East & Africa

+31743578156
info-sse@list.sensata.com

Asia Pacific

sales.isasia@list.sensata.com

China +86 (21) 2306 1500

Japan +81 (45) 277 7117

Korea +82 (31) 601 2004

India +91 (80) 67920890

Rest of Asia +886 (2) 27602006
ext 2808