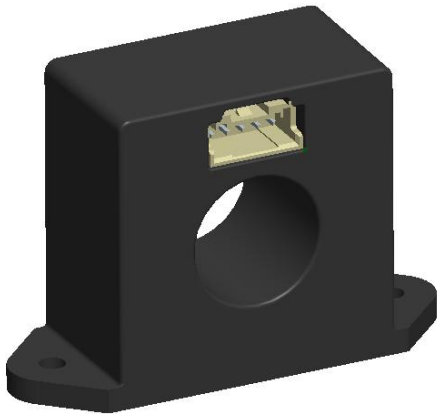


ARCS01S

Residual Current Detection Module for EV Charging Equipment

DC5V Power Supply, Pin-out Interface Version

- DC 6mA (IEC 62955)
- Type A 30mA and DC 6mA (IEC 62752; IEC 62955)



-
- Cost-effective solution of built-in residual current device for AC EV charger
 - Trip Pin output based on solely DC 6mA or Type-A 30mA +DC 6mA detection
 - Fast response time facilitating a broad selection of switching devices
 - Compact design with 17mm through-hole for charging cable up to 3P+N 32A

Technical Specification

#	Technical Specification	ARCS01S-ADC-H1	ARCS01S-DC6-H1
101	Rated operating voltage in monitoring circuit	230/400VAC	230/400VAC
102	Rated current in monitoring circuit	≤ 32A	≤ 32A
103	Poles in monitoring circuit	1P+N / 3P+N	1P+N / 3P+N
104	Frequency in monitoring circuit	50Hz	50Hz
105	Rated impulse withstand voltage in monitoring circuit	6kV	6kV
106	Over-voltage category in monitoring circuit	III	III
201	Rated operating voltage in control circuit, Vcc	5VDC±3%	5VDC±3%
202	Power consumption	<500mW	<500mW
203	Pin 1 – V _{cc}	5VDC	5VDC
204	Pin 2 – TRIP	AC&DC Trip	DC Trip
205	Pin 3 – GND	GND	GND
206	Pin 4 – CAL	CAL	CAL
207	Pin 5 - TEST	Test	Test
301	Rated DC residual operating current I _{Δdc}	6mA	6mA
302	Rated DC residual non-operating current I _{Δndc}	3mA	3mA
303	Rated AC residual operating current I _{Δn}	30mA	-
304	Rated AC residual non-operating current I _{Δnc}	15mA	-
305	Electrical endurance	20,000	20,000
306	Rated operating temperature	-40~85 °C	-40~85 °C
307	Pollution degree	2	2

Residual Current Detection Characteristics

Operating Current

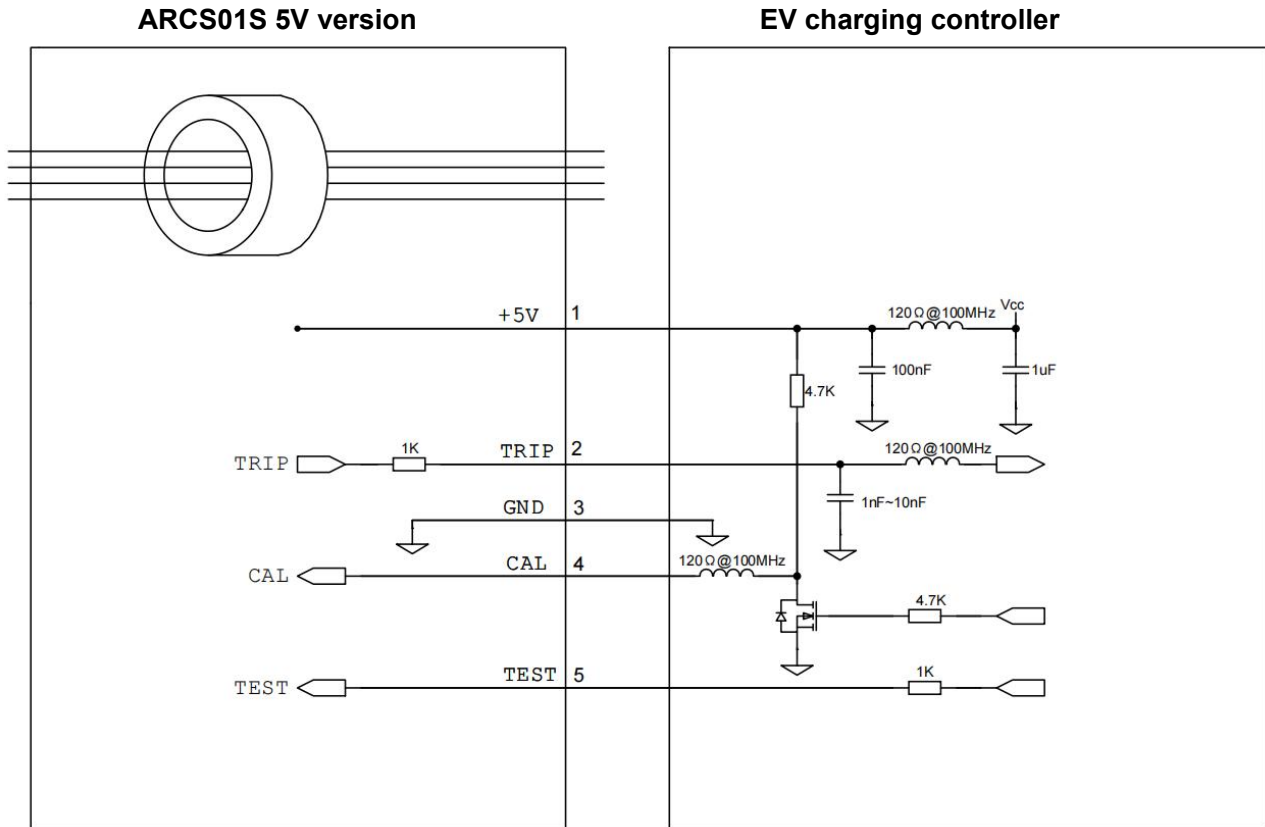
#	Operating Current	ARCS01S-ADC-H1	ARCS01S-DC6-H1
401	Smooth DC	4.0~6.0 mA	4.0~6.0 mA
402	DC rectified from 2 phases	4.0~7.0 mA	4.0~7.0 mA
403	DC rectified from 3 phases	4.0~6.2 mA	4.0~6.2 mA
404	Sinewave AC	22.0~28.0 mA	-
405	A0 pulsating DC	10.5~42.0 mA	-
406	A90 pulsating DC	7.5~42.0 mA	-
407	A135 pulsating DC	3.3~42.0 mA	-

Operating Time

#	Response time	ARCS01S-ADC-H1	ARCS01S-DC6-H1
501	Smooth DC 6mA	≤ 500 ms	≤ 500 ms
502	Smooth DC 60mA	≤ 200 ms	≤ 200 ms
503	Smooth DC 200mA	≤ 70 ms	≤ 70 ms
504	Smooth DC 300mA	≤ 20 ms	-
505	DC rectified from 2 phases 60mA	≤ 200 ms	≤ 200 ms
506	DC rectified from 2 phases 200mA	≤ 70 ms	≤ 70 ms
507	DC rectified from 2 phases 300mA	≤ 20 ms	-
508	DC rectified from 3 phases 60mA	≤ 200 ms	≤ 200 ms
509	DC rectified from 3 phases 200mA	≤ 70 ms	≤ 70 ms
510	DC rectified from 3 phases 300mA	≤ 20 ms	-
511	AC 30mA	≤ 80 ms	> 10000 ms
512	AC 60mA	≤ 60 ms	> 300 ms
513	AC 150mA	≤ 20 ms	> 80 ms
514	AC 5A	≤ 20 ms	> 80 ms

Application Notes of 5V DC Interface Version

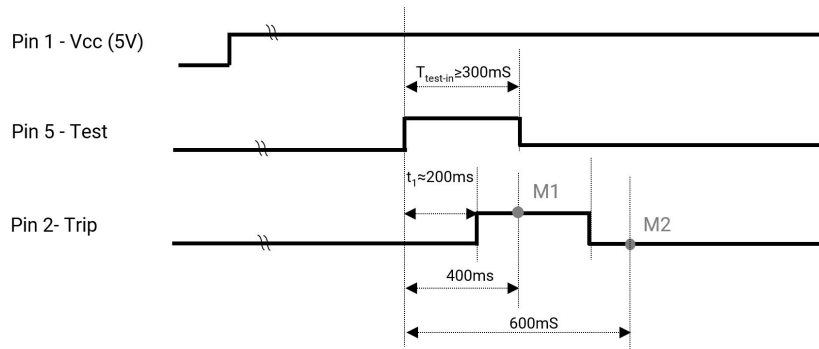
Typical application diagram



Additional information

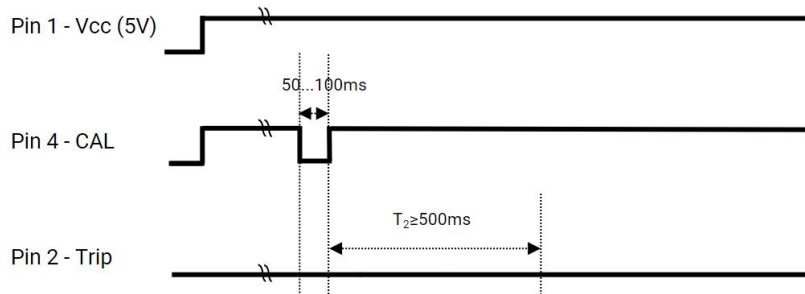
- Vcc Pin** (Power supply pin): The power supply voltage range to the detection module is 4.85 - 5.15 VDC, and the power ripple is not higher than 150mV. Ferrite beads and filter capacitors are suggested to be placed close to the Vcc pin. In addition, a LDO - such as LP2985A-50DBV- is strongly recommended to be used.
- Trip Pin** (Fault signal output pin): When residual current in the circuit exceeds the threshold, the output level changes from low to high. Suggest adding ferrite beads and filter capacitors close to this pin. A direct connection of Pin 2 to switching devices- such as relays or contactors- is NOT allowed. The trip signal of Pin 2 is suggested to be monitored by the charging controller MCU.
- CAL Pin** (Calibration command input pin): When this pin is pulled low for 50-100ms and then returns to high, the detection module enters calibration mode. Please use this pin to initial a calibration process during the start-up of the charge. Please ensure the charging circuit is disconnected during this process to prevent any residual current in the circuit from affecting calibration.
- TEST Pin** (Self-test input pin): Before starting every charging, this pin is used to perform a simulated test to verify whether the detection module functions correctly.

Self-test time chart



A self-test excluding offset calibration is activated if Pin 5 - Test is connected to a high level for a period above 300ms. t_r is the response time for internally generated test current.

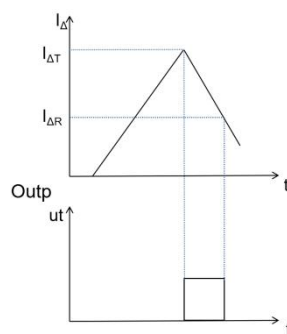
Offset calibration time chart



An offset calibration is activated if Pin 4 - CAL is connected to GND for a period of 50ms to 100ms. An offset calibration can be activated at regular intervals (such as start-up) or after the occur of certain critical events (such as short circuit). T_2 (≥ 500 ms) indicates the waiting period for the calibration to complete.

Attention: During the offset calibration, NO leakage current or any other current may flow through the device and the relays/contactors must be open. Also, the power supply voltage at Pin 1 Vcc must be stay at 5VDC \pm 3%.

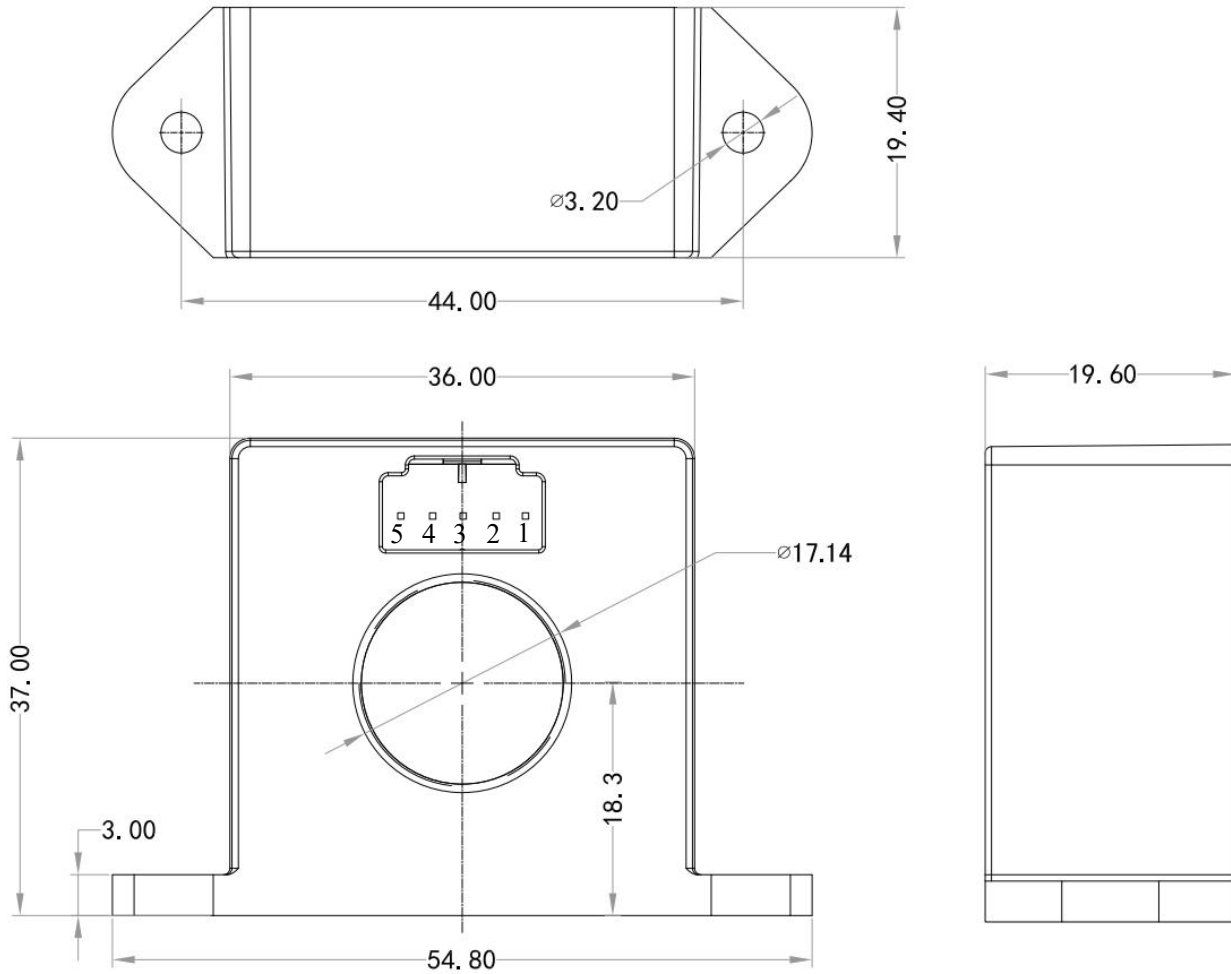
Trip Pin Signal Flip Threshold:



If the trip-level $I_{\Delta T}$ (Typical values of DC 5mA & AC 24mA) is accomplished the output will change their state from low-level (GND) to high level. Depending on the existence of the residual current I_{Δ} , the output will remain in this state until I_{Δ} falls below the threshold $I_{\Delta R}$ (Typical value of 60%).

Mechanical dimensions

ARCS01S-ADC/DC6-H1:



	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
ARCS01S-ADC-H1	5V DC	AC & DC Trip	GND	CAL	Test
ARCS01S-DC6-H1	5V DC	DC Trip	GND	CAL	Test

Ordering information

#	Order Number	Description
1	ARCS01S-ADC-H1	ARCS01S Residual Current Detection Module, 5V DC Type A 30 mA + DC 6mA, 32A, 1P+N / 3P+N
2	ARCS01S-DC6-H1	ARCS01S Residual Current Detection Module, 5V DC DC 6mA, 32A, 1P+N / 3P+N

Additional Notes

- Do NOT allow strong static electricity near the detector, because static electricity could damage the ICs inside. Take ESD protection when handling.
- Do NOT drop the detector module or conduct any other mechanical stress to it, because such stress may change its performance characteristics.
- Please place the detector with an appropriate distance from components that can generate high magnetic fields, such as relays or contactors, to ensure accurate residual current detection.
- Please refer to the product standards of RCD/RDC-DD (Residual Current Device / Residual Direct Current Detection Device), when designing built-in RCD/RDC-DD for mode-2/3 Electric Vehicle Supply Equipment with the detector.



The detector module is fragile to be damaged by ESD, antistatic aids should be taken while handling

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