RCG40-E11S

Features

> Special B-type charging station and compatible with A+6 on-board residual current protection module
> All in One highly integrated digital residual current action indicator
> Integrated self-test and calibration pins save customers' hardware resources
> Designed for primary side load single phase max 40A rms

Standard

> Meet the requirements of GB/T 41589 (IEC 62752) for the residual current operation characteristics related to mode 2 charging
> Meet the residual current action characteristics requirements of RDC-PD related to mode three charging in GB/T 40820 (IEC 62955)
> Meet the basic residual current operating characteristics requirements of GB/T 22794 (IEC 62423) and adapt to DC 6mA testing requirements

Product Apperance

Trip-Current (residual current related characteristics)

Wav.	Freq.	Min.	Typ.	Max.	Unit
AC	50Hz	20.0	23.2	26.0	mA
A0	50Hz	11.0	20.0	42.0	mA
A90	50Hz	10.0	30.0	42.0	mA
A135	50Hz	10.0	35.0	42.0	mA
2PDC	50Hz	3.5	5.3	7.0	mA
3PDC	50Hz	3.1	4.7	6.2	mA
S-DC	-	3.0	4.7	6.0	mA
F	-	15.0	38.0	42.0	mA

Trip-Time (residual current related characteristics)

Wav.	Freq.	Current	Typ.	Unit
AC	50Hz	30mA	155.0	ms
AC	50Hz	60mA	55.0	ms
AC	50Hz	150mA	18.0	ms
A0	50Hz	42mA	45.0	ms
A0	50Hz	84mA	20.0	ms
A0	50Hz	350mA	20.0	ms
A0	50Hz	42mA+6mADC	45.0	ms
A0	50Hz	84mA+6mADC	35.0	ms
2PDC/3PDC	50Hz	60mA	45.0	ms
2PDC/3PDC	50Hz	120mA	20.0	ms
2PDC/3PDC	50Hz	300mA	20.0	ms
S-DC	-	6mA	180.0	ms
S-DC	-	60mA	45.0	ms
S-DC	-	300mA	15.0	ms
F	-	210mA	18.0	ms

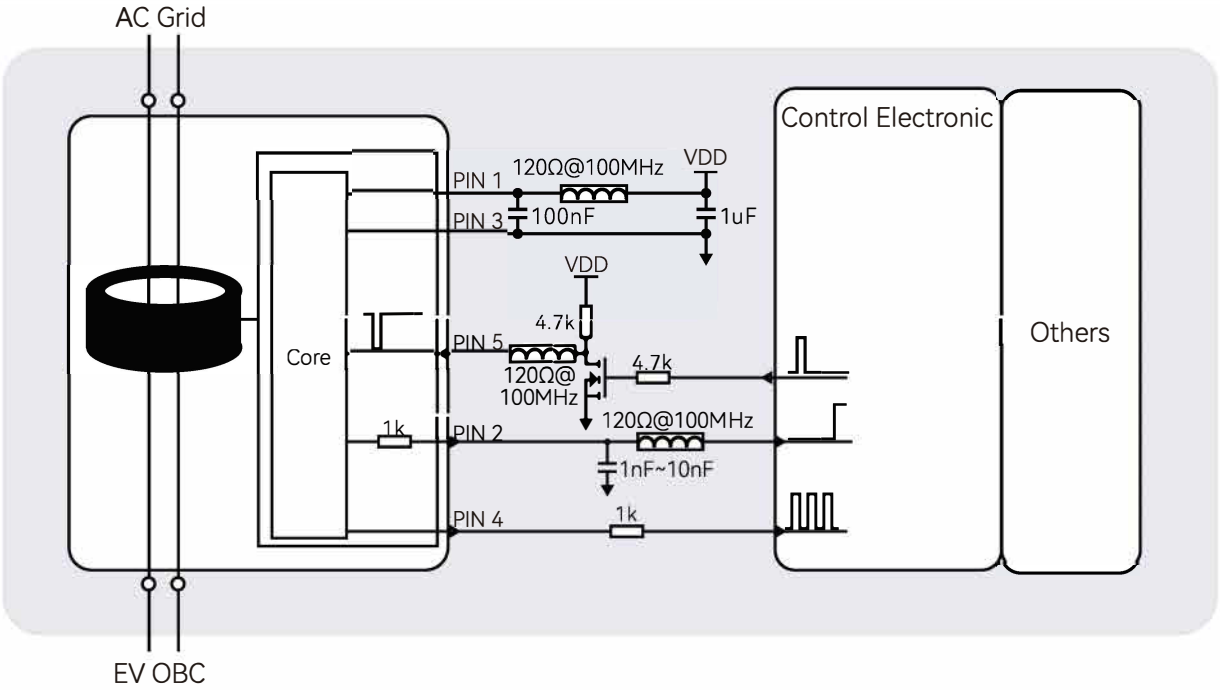
Electrical & Reliability Characteristics

Char.	Value
Working Temperature	-40℃~105℃
Storage Temparature	-40℃~105℃
Supply Voltage (VDD) (1)	4.85~5.15 VDC
Consumption	110 mW
Clearance, Primary-Primary	≥ 7.3 mm
Clearance, Primary-Secondary	≥ 5.8 mm
Creepage distance, Primary-Primary	≥ 7.3 mm
Creepage distance, Primary-Secondary	≥ 5.8 mm
FIT (2)	Contact us
Designed Life (3)	≥ 20 years
Working Altitude (4)	≤ 4000m

(1) It is sugguested to control VDD within 4.9~5.1 VDC to get better performance
(2) The calculation of FIT according to IEC 61709 , is based on the FIT values of different different components in the BoM list . And the calculation principle : ground mobile , no dust or harmful substances
(3) The calculation and claim of product life is based on the MTBF value according to IEC 61709
(4) The calculation about altitude is based on the principles : reinforced insulation , insulation material group 3 , pollution degree 2 , overvoltage category 3

RCG40-E11S

Typical Application Schematic & Pin Definition

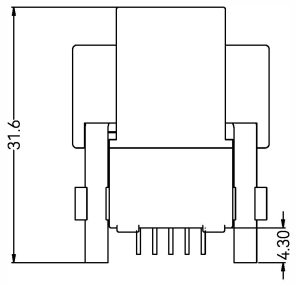


Pin-No.	Pin Name	Function
PIN-1	VDD	> Product power supply pins, standard supply voltage 5 VDC > The input voltage range is required to be 4.85~5.15 VDC, and the power output capability is > 100mA > Power supply ripple ≤ 150mV (LDO circuit is recommended, special attention needs to be paid to the load response performance of the LDO chip, refer to the power chip LP2985A-50DB) > It is recommended to add beads and filter capacitors to the power supply and place them close to the pins
PIN-2	TRIP	> When it is detected that there is residual current in the line that exceeds the threshold, the output level changes from low to high > Output current drive capability ≤ 5mA > Pin has a built-in 1kΩ current-limiting resistor > It is recommended to add beads and filter capacitors to the power supply and place them close to the pins
PIN-3	GND	> Product power grounding pins
PIN-4	Status	> When the product is operating normally, it outputs a 1kHz, 50% duty cycle PWM waveform > When VCC drops from 5V to below VMT, the output is high > When the VCC voltage rises above VRT, the output returns to a 1kHz, 50% duty cycle PWM waveform
PIN-5	TEST-IN	> When the pin is pulled down to 0 VDC, the system detects the offset of the currently set zero point and stores it in the MCU's registers to complete the calibration > After the calibration is completed, the system will generate simulated residual current through the internal analog residual current circuit to self-check whether the product can respond to the residual current action normally. After the self-test analog current is generated, the TRIP pin will generate a residual current action indication accordingly > It is recommended that the PIN pin add beads and place them close to the pins Note: > When using the TEST-IN function, it is necessary to keep the main circuit open to ensure that the residual current is not present in the line and to prevent abnormal product calibration values > When using this pin, be sure to design it according to the recommended timing logic (see the recommended timing diagram for details)

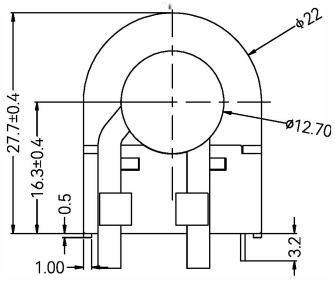
RCG40-E11S

Product Dimension

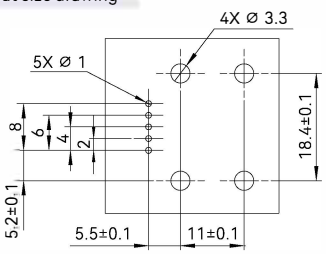
Rear view



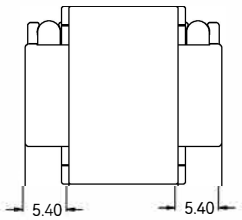
Left view



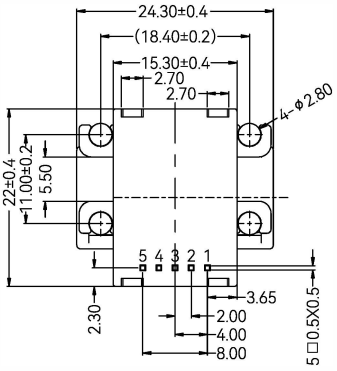
Recommended package cut-out size drawing

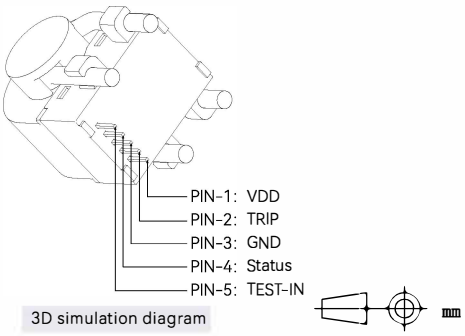


Top view



Bottom view



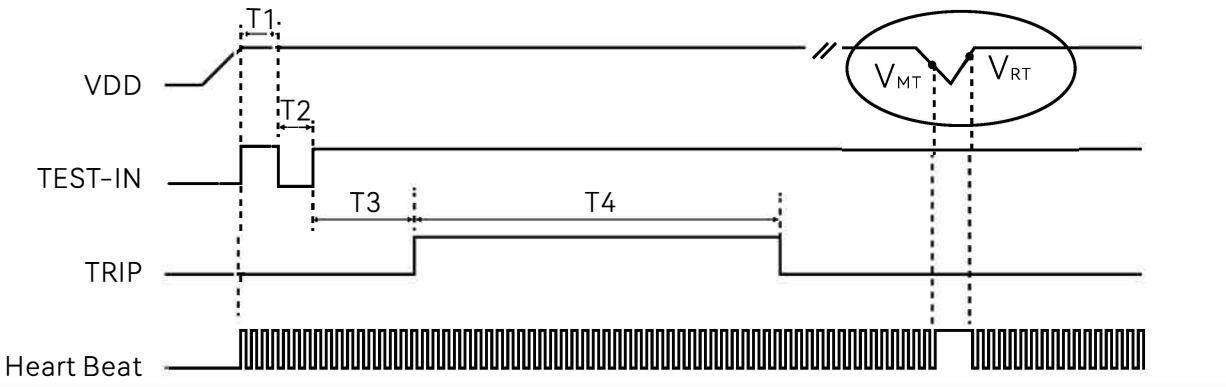


3D simulation diagram

* The limit deviation of unmarked dimensional tolerance shall be in accordance with GB/T 14486-MT5/B

Dimensions in mm

Timing Diagram



> It is recommended that VDD starts from 0V, with a monotonic power-up process and a duration of less than 15ms.

> T1 is the waiting time after power-up is completed; it is recommended that T1 ≥ 100ms.

> T2 is the system self-check and internal calibration command; it is recommended that 50ms ≤ T2 ≤ 100ms. When the pin remains low for more than 50ms, the product begins the self-check test.

> T3 is the time to wait for the system to complete the internal self-check; it is recommended that T3 ≈ 200ms.

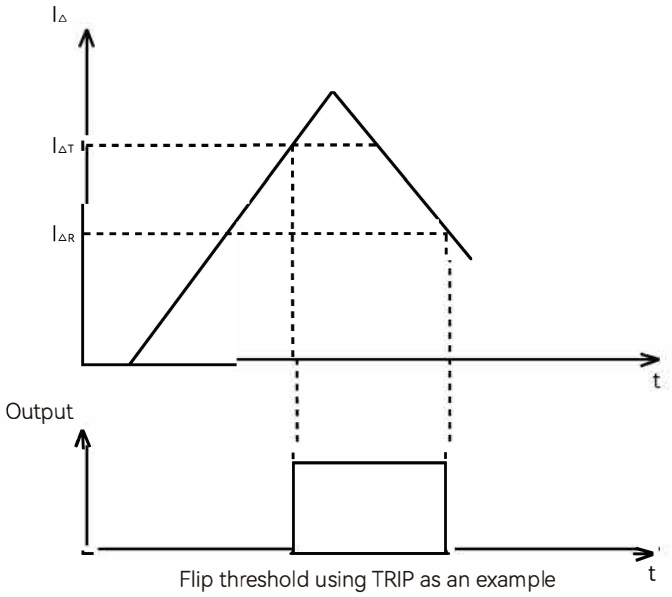
> T4 is the period when the system performs an internal simulated residual current self-check, and the TRIP indicator pin outputs a signal. The high-level duration is approximately 1.3s. After detecting the TRIP signal flip again, start the normal residual current detection workflow.

When VDD drops below VMT, the heartbeat signal switches from a 1kHz 50% duty cycle PWM waveform to a high level; when VDD rises above VRT, the heartbeat signal returns to a 1kHz 50% duty cycle PWM waveform.

Note: During the self-check and calibration process, that is, during T1, T2, T3, and T4, do not close the main circuit switch to prevent any residual current in the circuit from affecting the self-check and calibration process. Once the TRIP pin group flips, it can be determined whether the RCD module is functioning properly for subsequent operations.

RCG40-E11S

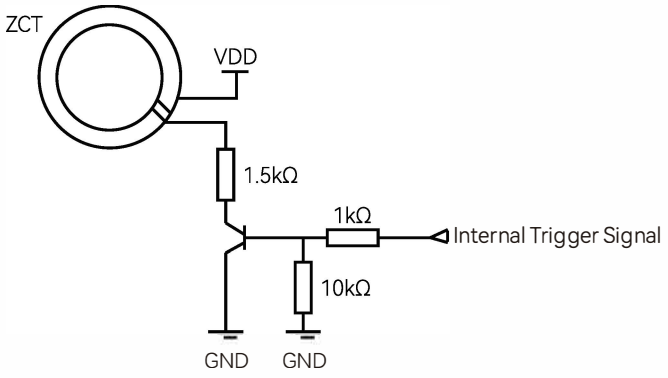
Digital Signal Flip Threshold



Flip threshold using TRIP as an example

> For avoiding the signal oscillation, tripping signal output flipping has been set with tripping threshold and recovery threshold
> When tripping threshold $I_{\Delta T}$ reached, the related X-OUT flip, and when the current decrease to the recovery threshold $I_{\Delta R}$, the related X-OUT flip again, back to low level state
> $I_{\Delta T}$ is set as 100% typical tripping value, and $I_{\Delta R}$ is set as 55% typical tripping value

Self-Test Circuit



> 2 widing on the ZCT to generate simualted DC residual current
> By using VDD to generate typical value = 6.53 mADC simulated residual current
> Use the most stringent 6mADC value to detect whether the module can work properly and identify residual current

Version history

Version number	Modifications	Reason for modification
V0.1.0	Create a new product specification	
V0.1.1	Adjust pin size	Customer requirements
V1.0.0	First official release	
V1.1.0	Adjust the pin order	Errata
V1.1.1	Update product size chart	Errata
V1.1.2	Update product feature parameters	Errata
V1.1.3	Update product sequence diagram	Change
V1.1.4	Product Tolerance Marking	Customer requirements
V1.1.5	Product Specification Review	Review
V1.1.6	New product packaging diagram	Add New
V1.2.0	Product Specification UI Upgrade	