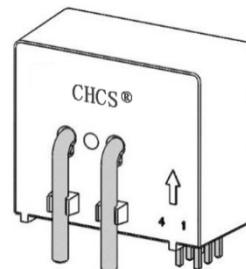


Magtron Residual Current Monitoring Unit(CHCS®)

CHCS101SM1

**Features**

- ◆ Self-check function
- ◆ Single Supply +5 V
- ◆ Positive output for ADC
- ◆ Printed circuit board mounting
- ◆ Overheat protection

Characteristics

- ◆ Stable accuracy
- ◆ self stimulation
- ◆ Low hysteresis offset voltage
- ◆ Short response time
- ◆ Integration frequency filter
- ◆ Compact design

Applications

- ◆ Appliance ground fault detection
- ◆ Solar inverter residual current
- ◆ Converter leakage current detection
- ◆ UPS and other power ground fault detection
- ◆ Electric vehicle charge station
- ◆ Single Phases differential current detection

Standards

- ◆ EN50178 IEC60950-1
- ◆ UL1741 VDE0126-1-1
- ◆ IEC62752 (Mode 2) & UL2231

Select Part List

Part Number	I_{PN} (mA)	I_{PM} (mA)	I_M (A)
CHCS101SM1-2EI	±60	±100	±20
CHCS101SM1-2AI	±300	±500	±20

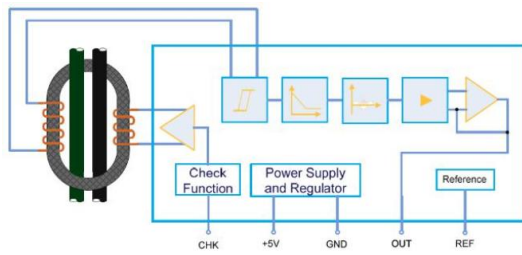
Overview

An important safety function of these devices is monitor of the leakage current of the entire system from Power modules or inverter against earth. A defective system can become dangerous for people or cause fires. Before it comes so far, the inverter must be disconnect from the grid. The leakage current contains DC and AC components. Therefore an AC/DC-sensitive monitoring unit is necessary. The heart of the safety device is the Magtron CHCS®, whose value is evaluated by the control system of the Power inverter.

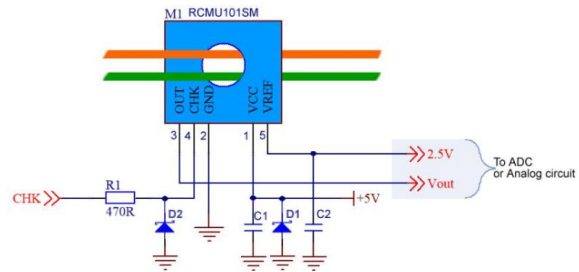
Generally protection devices with AC/DC-sensitive differential current sensors can be used everywhere, where flat or pulsating DC can develop, whose amount is permanently greater than zero.

Instruction of installation in a Pollution Degree 2 environment is available on the table below(or equivalent statement).

Application circuit



Functional block diagram



Application circuit

Note: C1/C2/D1 /D2 should be close to the current sensor's pin

CHCS101SM1-2EI Component selection reference:

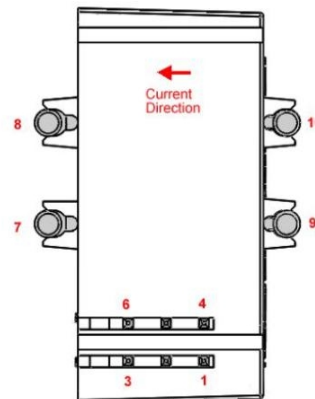
Designator	Description
C1	X7R, 10uF/16V, ±10%, 0805
C2	X7R, 1uF/16V, ±10%, 0603
D1, D2	Ruilon, TVS, SMFJ5.0A, SOD-123

CHCS101SM1-2AI Component selection reference:

Designator	Description
C1	X7R, ≧ 22uF/16V, ±10%, 1206
C2	X7R, 10uF/16V, ±10%, 0805

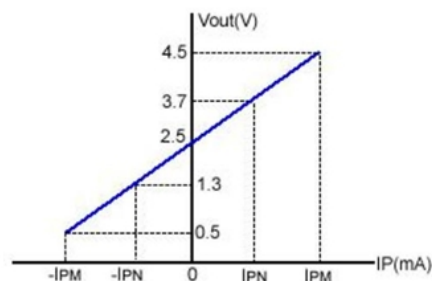
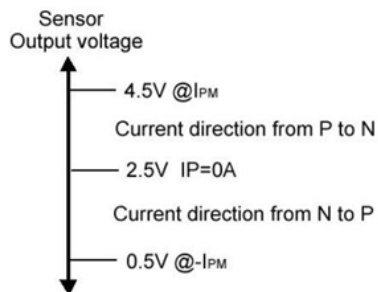
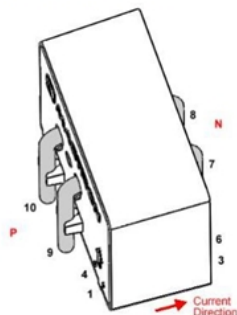
Pin Definition

NO.	Symbol	Description
3	VO	Signal output
4	CHK	Product Self-Check input (悬空即可)
2	GND	Power GND
1	VCC	Power supply
5	REF	Reference voltage output
7-10	IP	Primary Current



Assembly Pin

Current direction



Relationship between IP and output voltage

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage(not operating)	V_C			5.5	V
Ambient operating temperature	T_A	-40		+105	°C
Ambient storage temperature	T_A	-40		+105	°C

Isolation Characteristics

Parameter	Symbol	Min	Unit
Rms voltage for AC insulation test, 50 Hz, 1 min	U_d	3	kV
Impulse withstand voltage 2/20 μ s	U_w	5	kV
Partial discharge extinction rms voltage @ 10 pC	U_e	TBD	kV
System working voltage (RMS)	V_s	<750	V
Comparative Tracking Index (group I)	CTI	600	V
Clearance (See drawing in page 6)	DCI	TBD	mm
Creepage distance (See drawing in page 6)	DCP	TBD	mm
Application example	-	300, CAT III, PD2	V
Application example	-	600, CAT III, PD2	V

Other Characteristics

Parameter	Symbol	Value	Unit
Supply Voltage(not operating)	T_{WSP}	260	°C
Ambient operating temperature	T_P	140~150	°C
Ambient storage temperature	T_{PR}	55~65	°C

Electrical data CHCS101SM1-2EI

At $T_a=25^\circ\text{C}$, $V_c=5\text{V}$, unless otherwise noted

Parameter	Symbol	Min	Typ	Max	Unit	Comment
Power Supply voltage	V_c	4.9	5	5.1	V	2%
Current consumption	I_c		20	30	mA	
Primary differential current	I_{PN}		± 60		mA	

Measurement range	I_{PM}		± 100		mA	
Output static state voltage	V_{OS}		2.5		V	$I_{PM}=0A$
Output voltage	$V_{ON (+)}$		3.7		V	+ I_{PN}
Output voltage	$V_{OM (+)}$		4.5		V	+ I_{PM}
Output voltage	$V_{ON (-)}$		1.3		V	- I_{PN}
Output voltage	$V_{OM (-)}$		0.5		V	- I_{PM}
Output voltage Gain	V_G		0.2		V	10mA
Electrical offset voltage	V_{OE}		<25		mV	
Accuracy	X		2		%	$I_{PM}/25^{\circ}C$
Full temperature zone Accuracy	X_{FT}		4		%	$I_{PM}/-40\sim 85^{\circ}C$
Linearity error	ϵ_L		1		%	I_{PN}
Bandwidth	BW	630	700		Hz	-3dB
Check current	I_{CK}		30		mA	10%
Output voltage (Check function)	$V_{(CK)}$		$V_{OS}+0.6$		V	
Check enable voltage	V_{CE}	3.6		V_c	V	
Check disabled voltage	V_{CD}		<0.2		V	
Reference Voltage 1	V_{REF}	2.487	2.5	2.512	V	$25^{\circ}C$
Reference Voltage 2	V_{REF}	2.450	2.5	2.550	V	$-40\sim 85^{\circ}C$
Fault over current recovery limit	I_M		20		A	

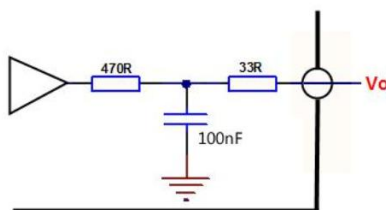
Electrical data CHCS101SM1-2AIAt $T_a=25^{\circ}C, V_c=5V$, unless otherwise noted

Parameter	Symbol	Min	Typ	Max	Unit	Comment
Power Supply voltage	V_c	4.9	5	5.1	V	2%
Current consumption	I_c		20	30	mA	
Primary differential current	I_{PN}		± 300		mA	
Measurement range	I_{PM}		± 500		mA	
Output static state voltage	V_{OS}		2.5		V	$I_{PM}=0A$
Output voltage	$V_{ON (+)}$		3.7		V	+ I_{PN}
Output voltage	$V_{OM (+)}$		4.5		V	+ I_{PM}
Output voltage	$V_{ON (-)}$		1.3		V	- I_{PN}
Output voltage	$V_{OM (-)}$		0.5		V	- I_{PM}
Output voltage Gain	V_G		0.4		V	10mA
Electrical offset voltage	V_{OE}		<25		mV	
Accuracy	X		2		%	$I_{PM}/25^{\circ}C$
Full temperature zone Accuracy	X_{FT}		4		%	$I_{PM}/-40\sim 85^{\circ}C$
Linearity error	ϵ_L		1		%	I_{PN}

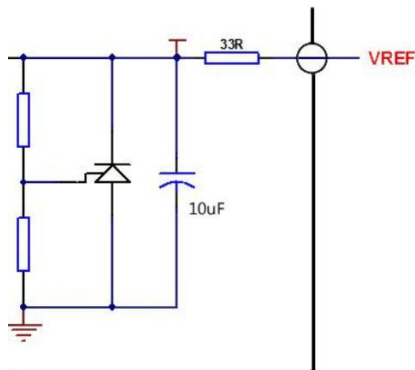
Bandwidth	BW	630	700		Hz	-3dB
Check current	I_{CK}		50		mA	10%
Output voltage (Check function)	$V_{(CK)}$		$V_{OS}+0.2$		V	
Check enable voltage	V_{CE}	2.7		V_c	V	
Check disabled voltage	V_{CD}	0	<0.2		V	
Reference Voltage 1	V_{REF}	2.475	2.5	2.525	V	25°C
Reference Voltage 2	V_{REF}	2.450	2.5	2.550	V	-40~85°C
Fault over current recovery limit	I_M		20		A	

Circuit interface

V_{OUT} output interface internal circuit



V_{REF} output interface internal circuit

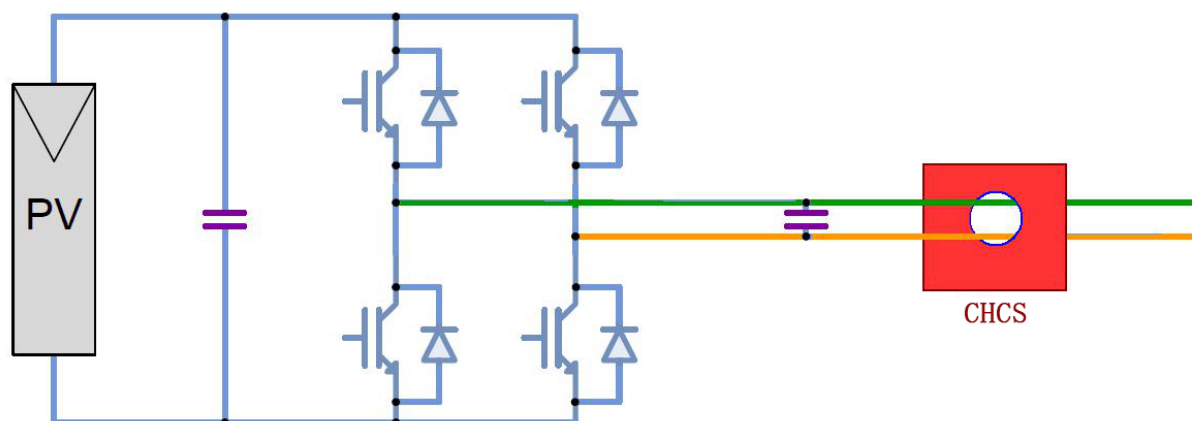


Application information

Self-check Function

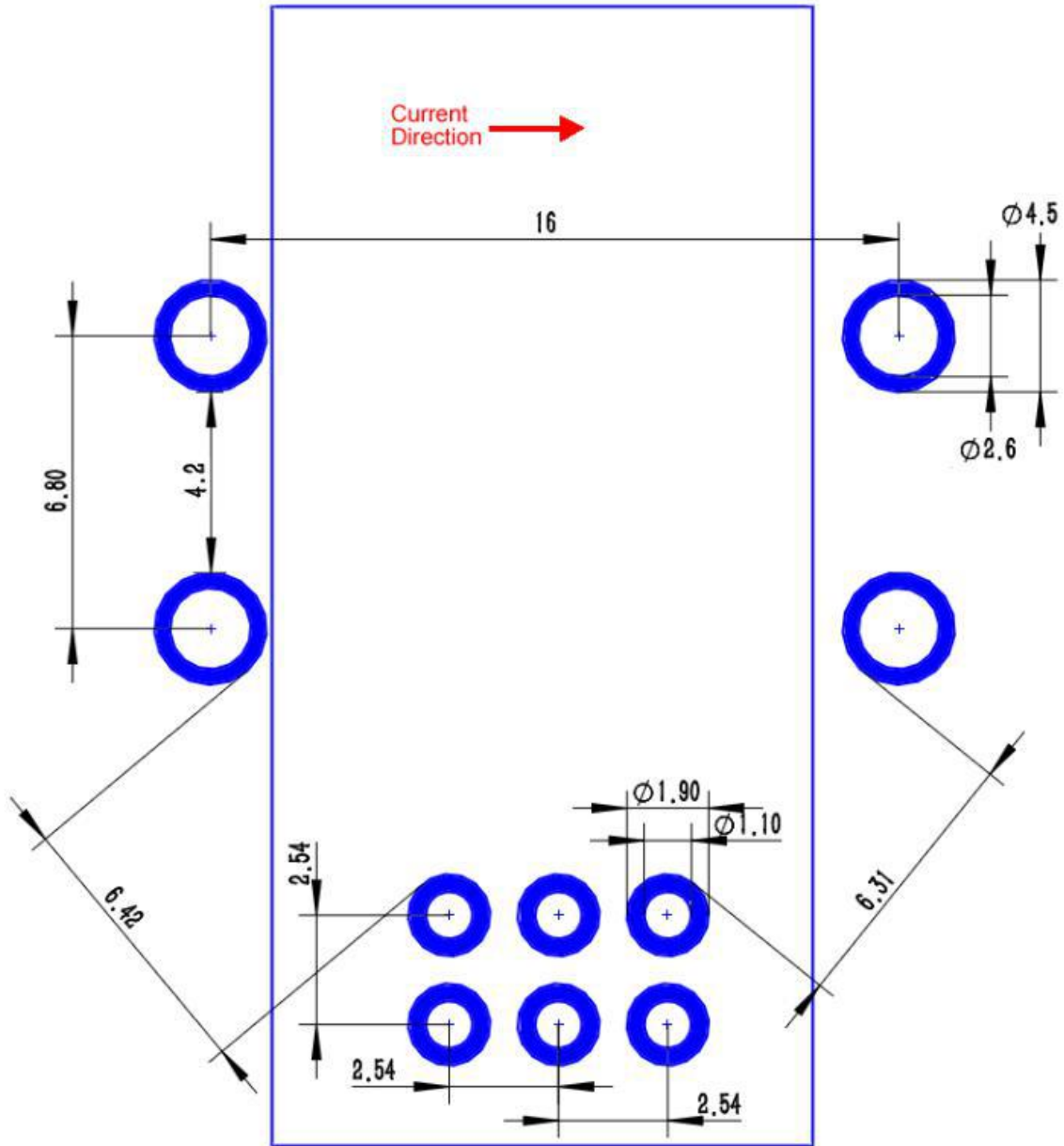
Set the CHK pin to high status. CHCS will run in self-test mode, check the out pin, equivalent to the status I_p equal I_{ck} , at this time the output has equal voltage, the detector is OK. Then sets CHK to low voltage $V_{check} < 0.2V$. The CHCS starts to run in the residual current.

Photovoltaic Inverter Residual Current



From VDE0126-1-1, Inverters without a basic insulation (e.g. basic insulated transformer) between the grid and the photovoltaic-Generator must have a fault current monitoring unit (CHCS) installed. The d.c. and a.c. component of the fault current depend on the construction of the inverter and on the d.c. voltage of the PV-generator.

PCB Footprint



PCB Holes Secondary pins: $\phi 1.1 \times 1.9$
Primary Pins: $\phi 2.6 \times 4.5$

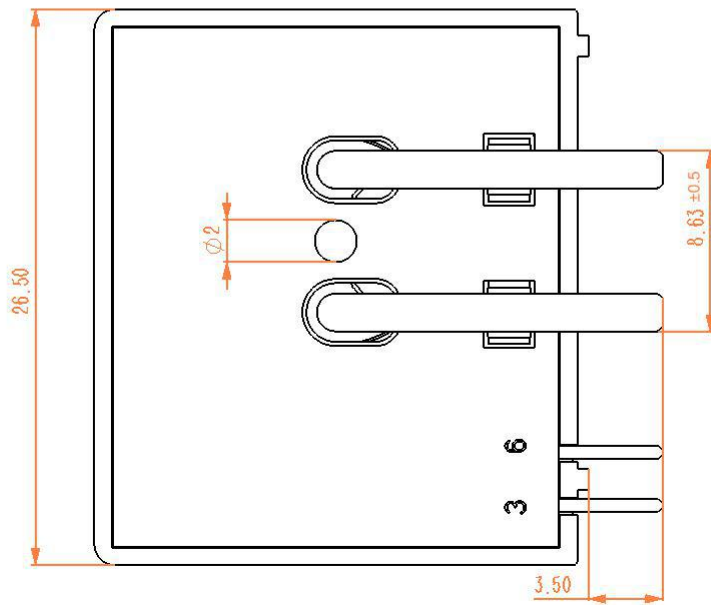
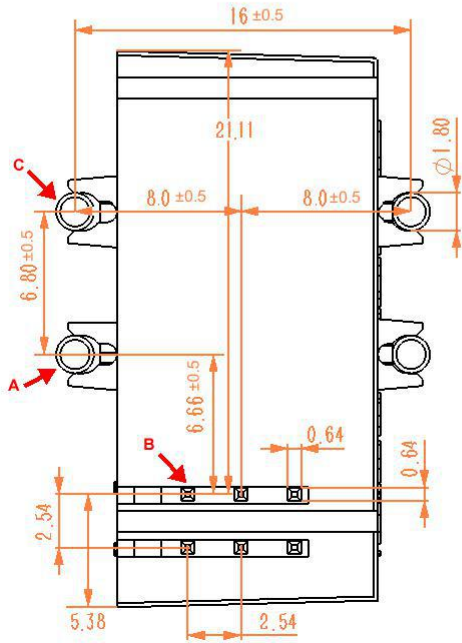
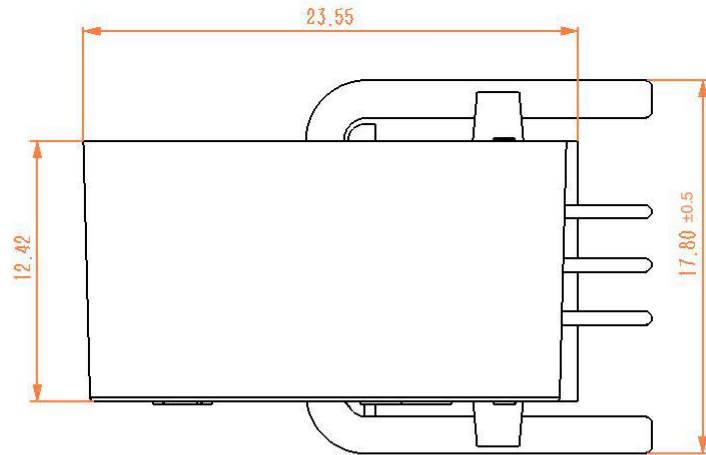
Dimensions

Mechanical Characteristics (Unit : mm, Tolerance in ± 0.2)

	DCI	DCP
A-B	7.2	--
A-C	5	≥ 5.5
C-D	--	≥ 8.5

D is secondary inside the transducer

On the customer's PCBA		
	DCI	DCP
A-B	6.4	6.4
A-C	4.2	4.2



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