

## CURRENT SENSOR

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Product series: STK-CTS/xx

Product part number: STK-20CTS/DT  
STK-30CTS/DT  
STK-20CTS/T

Version: Ver 3.6



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## 1. Description

STK-CTS/xx series current sensors are based on open loop principle with TMR technology. The sensor can detect those current with DC, AC, pulse and irregular wave shape. Because of its very wide frequency band width of DC ~ 700 kHz, the sensor can detect both of string current and the ARC current at the same time. With build-in coil, the sensor supports the self-check function.

### Typical application

- String current in PV
- AC current detection
- Variable speed driving
- MPPT
- ARC current detection
- Switch mode power supply

### General parameters

Parameter	Symbol	Unit	Value
Working temperature	T <sub>A</sub>	°C	-40 ~ 85
Storage temperature	T <sub>stg</sub>	°C	-40 ~ 105
Mass	m	g	10

### Absolute parameters

Parameters	Symbol	Unit	Value
Supply voltage	V <sub>C</sub>	V	6
ESD rating (HBM)	U <sub>ESD</sub>	kV	4

Remark: the unrecoverable damage may occur when the product works on the conditions over the absolute maximum ratings. Long-time working on the absolute maximum ratings may cause the degradation on performance and reliability.

### Isolation parameters

Parameter	Symbol	Unit	Value	Remark
Isolation voltage, 50 Hz, 1 min	U <sub>d</sub>	kV	4	
Clearance	d <sub>Cl</sub>	mm	> 8	Shortest distance through air
Creepage distance	d <sub>Cp</sub>	mm	> 8	Shortest distance along device body
Case material			V0 according to UL 94	

## 2. STK-20CTS/T & STK-20CTS/DT parameters

Condition: V<sub>cc</sub> = 5.0 V, T<sub>A</sub> = 25°C, unless specified.

Parameters	Symbol	Unit	Min.	Typ.	Max.	Remark
Primary current	I <sub>pn</sub>	A		20		
Maximum current	I <sub>pm</sub>	A	-20		20	
Supply voltage	V <sub>cc</sub>	V	4.75	5	5.25	
Consumption current	I <sub>cc</sub>	mA		4		
Self-checking current	I <sub>ck</sub>	mA	2	2		The current requested for self-checking function
Build-in coil resistance	R <sub>lm</sub>	ohm		2.8		100-turns build-in coil
Build-in coil impedance	X <sub>Lck</sub>	ohm		80		@ 10 kHz
Full-scale output	V <sub>FS</sub>	V		2		$((V_{out@I_{pn}})-(V_{out@(-I_{pn})}))/2$
Output resistance	R <sub>out</sub>	Ω		10		@ V <sub>out</sub>
Offset voltage	V <sub>off</sub>	V	2.48	2.5	2.52	V <sub>out</sub> @ 0 A
Theoretical gain	G <sub>th</sub>	mV/A		100		2 V @ I <sub>pn</sub>
Gain error	Err <sub>G</sub>	%G <sub>th</sub>	-0.5		0.5	Adjusted @25°C
Non-linearity	Non-L	%I <sub>pn</sub>	-0.5		0.5	±I <sub>pn</sub>
Step response time	t <sub>res</sub>	μs		1		@90% of I <sub>PN</sub>
Delay time	t <sub>delay</sub>	μs		1		@ 500 kHz
-3 dB band width	BW	kHz		500		
Noise DC ~ 10 kHz DC ~ 100 kHz	V <sub>noise</sub>	mVpp		15 25		
Accuracy @ RT	X	% of I <sub>pn</sub>	-1		1	@ 25°C
Accuracy	X <sub>TRange</sub>	% of I <sub>pn</sub>	-2.5		2.5	-40°C ~ 85°C

### 3. STK-30CTS/DT parameters

Condition: Vcc = 5.0 V, T\_A = 25°C, unless specified.

Parameters	Symbol	Unit	Min.	Typ.	Max.	Remark
Primary current	I <sub>pn</sub>	A		30		
Maximum current	I <sub>pm</sub>	A	-30		30	
Supply voltage	Vcc	V	4.75	5	5.25	
Consumption current	I <sub>cc</sub>	mA		4		
Self-checking current	I <sub>ck</sub>	mA		2		The current requested for self-checking function
Build-in coil resistance	R <sub>lm</sub>	ohm		2.8		100-turns build-in coil
Build-in coil impedance	X <sub>Lck</sub>	ohm		80		@ 10 kHz
Full-scale output	V <sub>FS</sub>	V		2		$((V_{out@I_{pn}})-(V_{out@(-I_{pn})}))/2$
Output resistance	R <sub>out</sub>	Ω		10		@ V <sub>out</sub>
Offset voltage	V <sub>off</sub>	V	2.48	2.5	2.52	V <sub>out</sub> @ 0 A
Theoretical gain	G <sub>th</sub>	mV/A		66.7		2 V @ I <sub>pn</sub>
Gain error	Err <sub>G</sub>	%G <sub>th</sub>	-0.5		0.5	Adjusted @25°C
Non-linearity	Non-L	%I <sub>pn</sub>	-0.5		0.5	±I <sub>pn</sub>
Step response time	t <sub>res</sub>	μs		1		@90% of I <sub>PN</sub>
Delay time	t <sub>delay</sub>	μs		1		@ 500 kHz
-3 dB band width	BW	kHz		500		
Noise DC ~ 10 kHz DC ~ 100 kHz	V <sub>noise</sub>	mVpp		15 25		
Accuracy @ RT	X	% of I <sub>pn</sub>	-1		1	@ 25°C
Accuracy	X <sub>TRange</sub>	% of I <sub>pn</sub>	-2.5		2.5	-40°C ~ 85°C

#### 4. Frequency band width

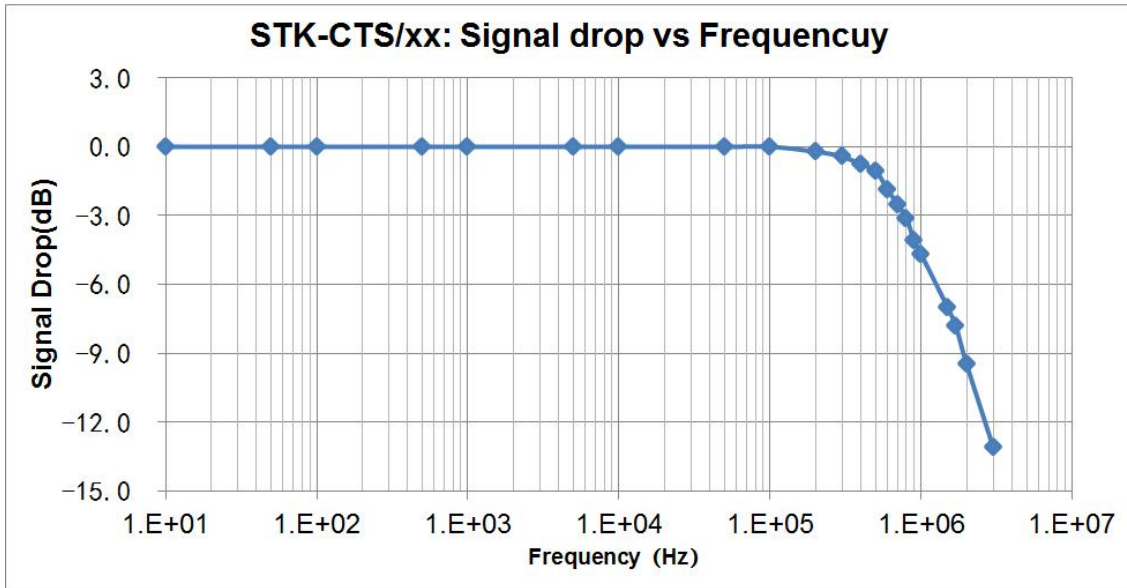


Fig.1 the band width of STK-CTS/xx series current sensors.

#### 5. Step response time

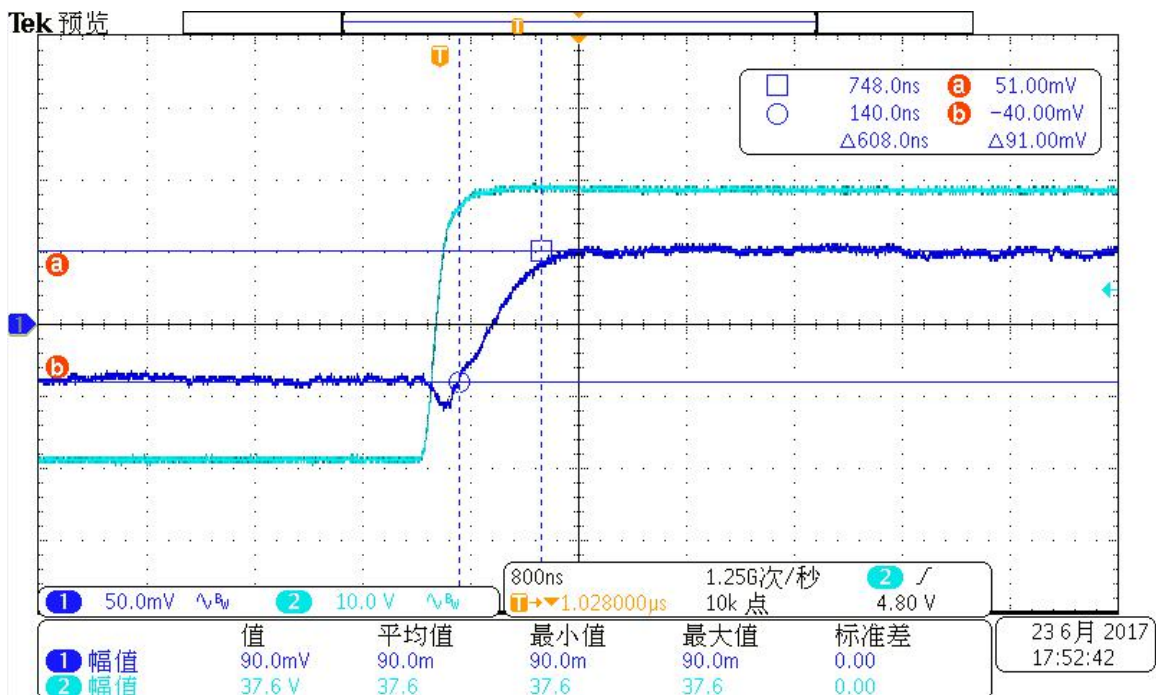


Fig.2 the step response time of STK-CTS/xx current sensors. The light blue is primary current, while the dark blue is output signal of current sensor. The step response time is less than 1  $\mu$ s.

## 6. Frequency delay performance

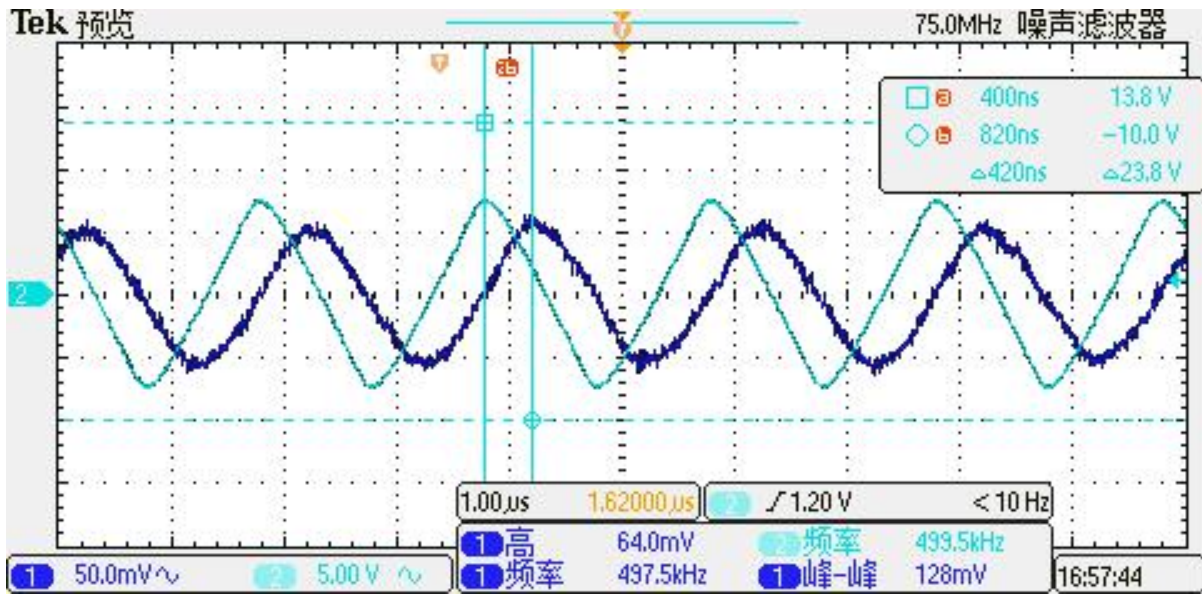
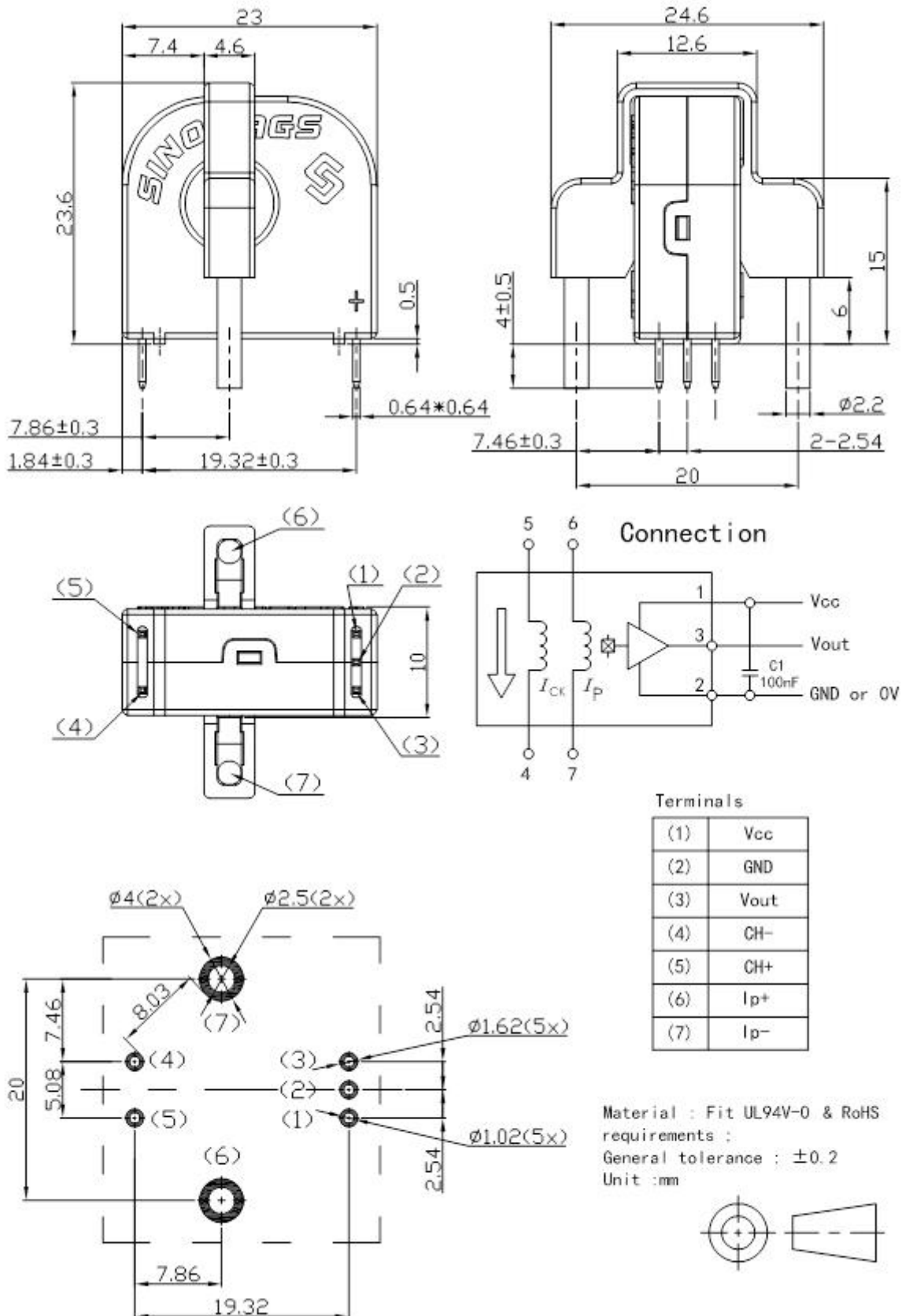


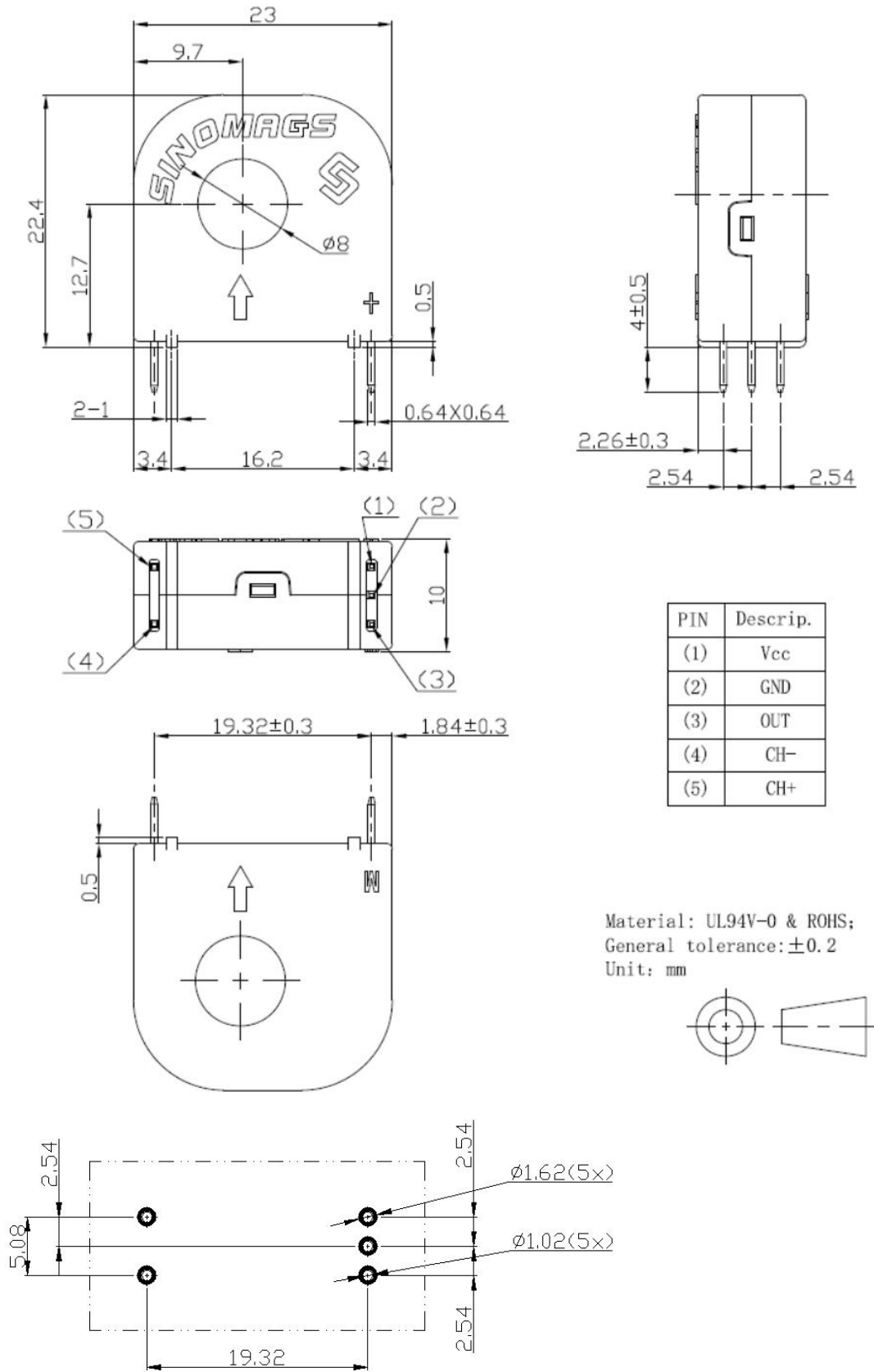
Fig.3 when detection the primary current with a frequency of 500 kHz. The delay time from primary current (light blue) to the output of the sensor (dark blue) is less than 1 μs.

## 7. STK-CTS/DZ: Dimensions & Pins & Footprint

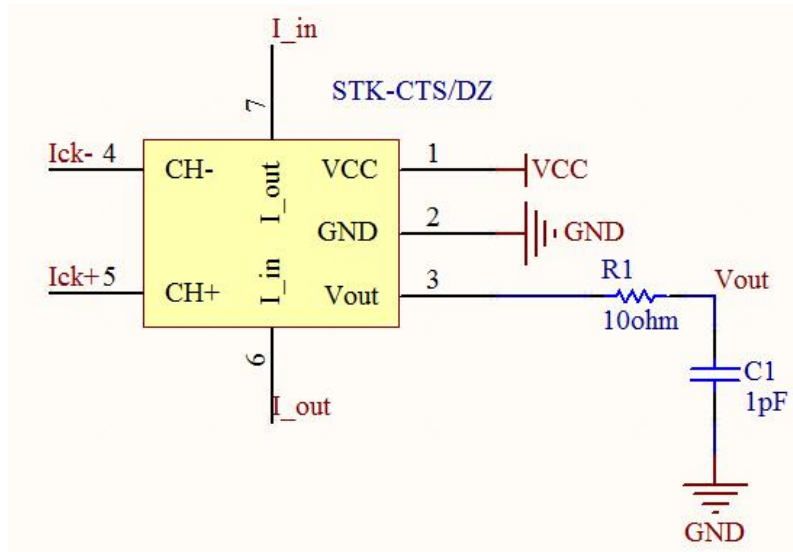




## 8. STK-CTS/Z: Dimensions & Pins & Footprint

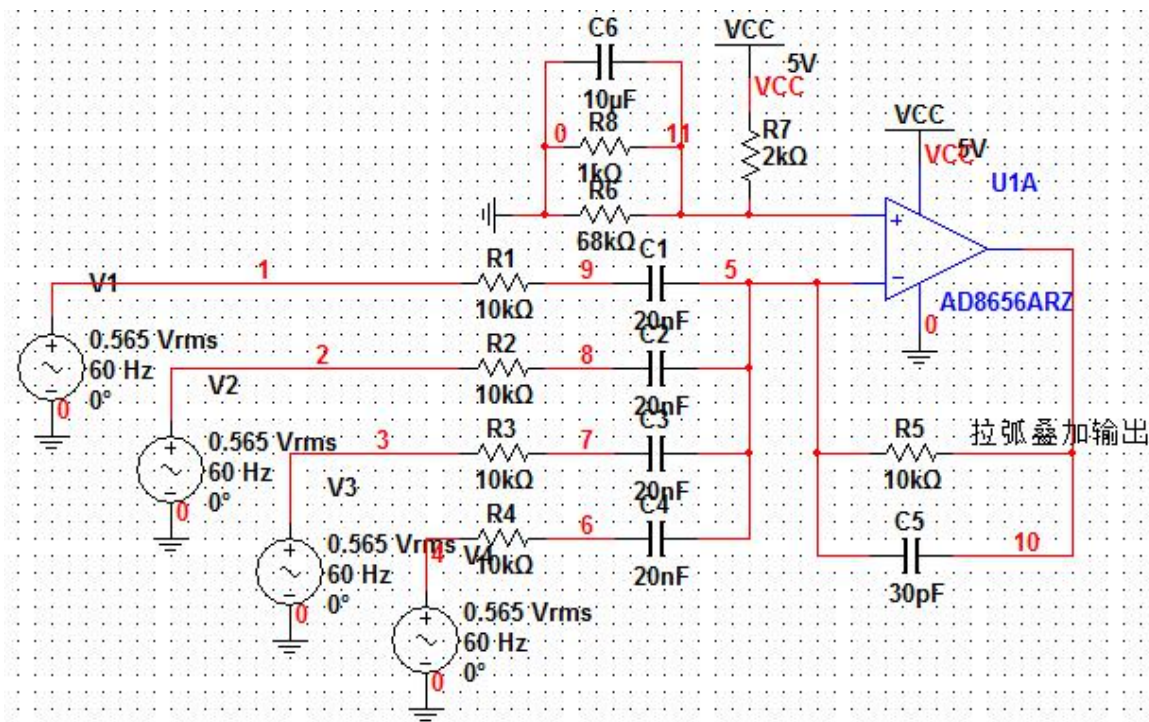


## 9. TYPICAL APPLICATION CIRCUIT (STRING)



R1 (ohm)	C1 (nF)	Theoretical -3 dB, $f = 1/(2\pi RC)$ , (kHz)	Measured -3 dB, (kHz)
100	1	1592	~ 500
240	4.7	141	~ 150
2000	9.4	8	~ 10

## 10. TYPICAL APPLICATION CIRCUIT (ARC CURRENT)



Note:

- 1、 The band-pass setting: 1 kHz ~ 500 kHz.
- 2、 The current for self-checking: frequency of ~ 10 kHz with amplitude of higher than 2 mA.