

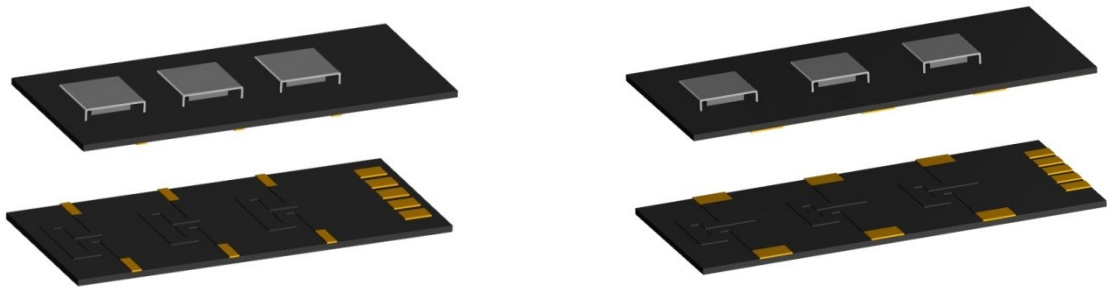
Current Sensor

Product Series: STK-6TPxx

Part number: STK-6TP05、STK-6TP15、
STK-6TP25

Version: Ver 2.0

Revision: 2018-08-09



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1. Description

The STK-6TP series current sensor is based on TMR (tunnel magnetoresistance) technology and open-loop design. It is suitable for DC, AC pulsed and any kind of irregular current measurement under the isolated conditions.

STK-6TPxx series sensors can monitor three phase currents independently.

Typical applications

- AC Variable speed drives
- Switched model power supplies (SMPS)
- PV string current
- Servo motor driver

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	°C	-40 ~ 105
Storage temperature	T_stg	°C	-40 ~ 105
Mass	m	g	10

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	V _{cc}	V	6.5
ESD rating (HBM)	U_ESD	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 parameter

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	U _d	kV	4	
Impulse withstand voltage 1.2/50μs	Ū _w	kV	6	
Clearance distance (pri. -sec)	d _{Cl}	mm	5	Shortest distance through air
Creepage distance (pri. -sec)	d _{Cp}	mm	5	Shortest path along device body

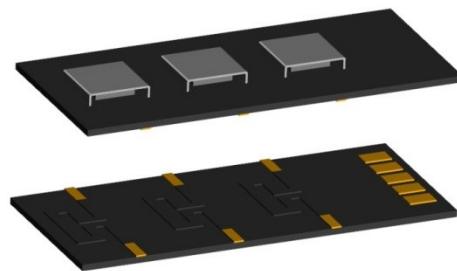
Measuring current table

Product	Optimized Range, I _{pn} (A)	Optimized Range, I _{pm} (A)	Sensitivity, (mV/A)	T(°C)
STK-05TP	5	10	200	-40 ~ 105
STK-15TP	15	37.5	53.33	-40 ~ 105
STK-25TP	25	25	80	-40 ~ 105

2. Electrical data STK-6TP05

 Condition: $T_A = 25^{\circ}\text{C}$, $V_{cc} = 5\text{V}$

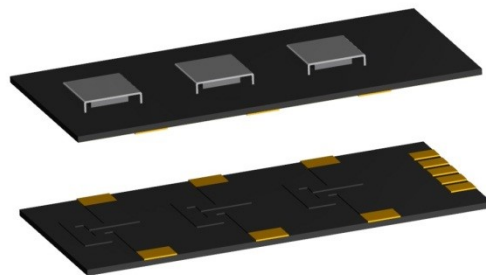
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_{pn}	A		5		
Primary current measuring range	I_{pm}	A	10		10	
Supply voltage	V_{cc}	V		5		+/-5%
Current consumption	I_{cc}	mA		12	20	
Rated output voltage	V_{FS}	V		1		($V_{out} @ \pm I_{pn}$) - V_{off}
Internal output resistance	R_{out}	Ω		1		V_{out}
Quiescent voltage	V_{off}	V		2.5		$V_{out} @ 0\text{ A}$
Theoretical gain	G_{th}	mV/A		200		2 V @ I_{pn}
Error of gain	Err_G	% G_{th}	-1		1	Trimmed in the factory @ 25°C
Rated linearity error	Non-L	% I_{pn}		1		$\pm I_{pn}$
Step response time	t_{res}	μs		3	5	@90% of I_{pn}
Frequency bandwidth (-3dB)	BW	kHz		120		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	V_{noise}	mVpp		15 30		
Accuracy @ 25°C	X	% of I_{pn}		± 1.5		@ 25°C
Accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-3.5		3.5	$-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$



3. Electrical data STK-6TP15

 Condition: $T_A = 25^{\circ}\text{C}$, $V_{cc} = 5\text{V}$

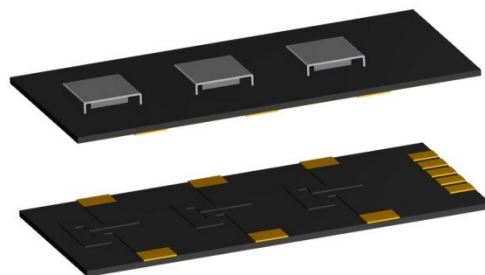
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_{pn}	A		15		
Primary current measuring range	I_{pm}	A	37.5		37.5	
Supply voltage	V_{cc}	V		5		+/-5%
Current consumption	I_{cc}	mA		12	20	
Rated output voltage	V_{FS}	V		0.8		($V_{out} @ \pm I_{pn}$) - V_{off}
Internal output resistance	R_{out}	Ω		1		V_{out}
Quiescent voltage	V_{off}	V		2.5		$V_{out} @ 0\text{A}$
Theoretical gain	G_{th}	mV/A		53.33		2 V @ I_{pm}
Error of gain	Err_G	% G_{th}	-1		1	Trimmed in the factory @ 25°C
Rated linearity error	Non-L	% I_{pn}		1		$\pm I_{pn}$
Step response time	t_{res}	μs		3	5	@90% of I_{pn}
Frequency bandwidth (-3dB)	BW	kHz		120		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	V_{noise}	mVpp		15 30		
Accuracy @ 25°C	X	% of I_{pn}		± 1.5		@ 25°C
Accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-3.5		3.5	$-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$



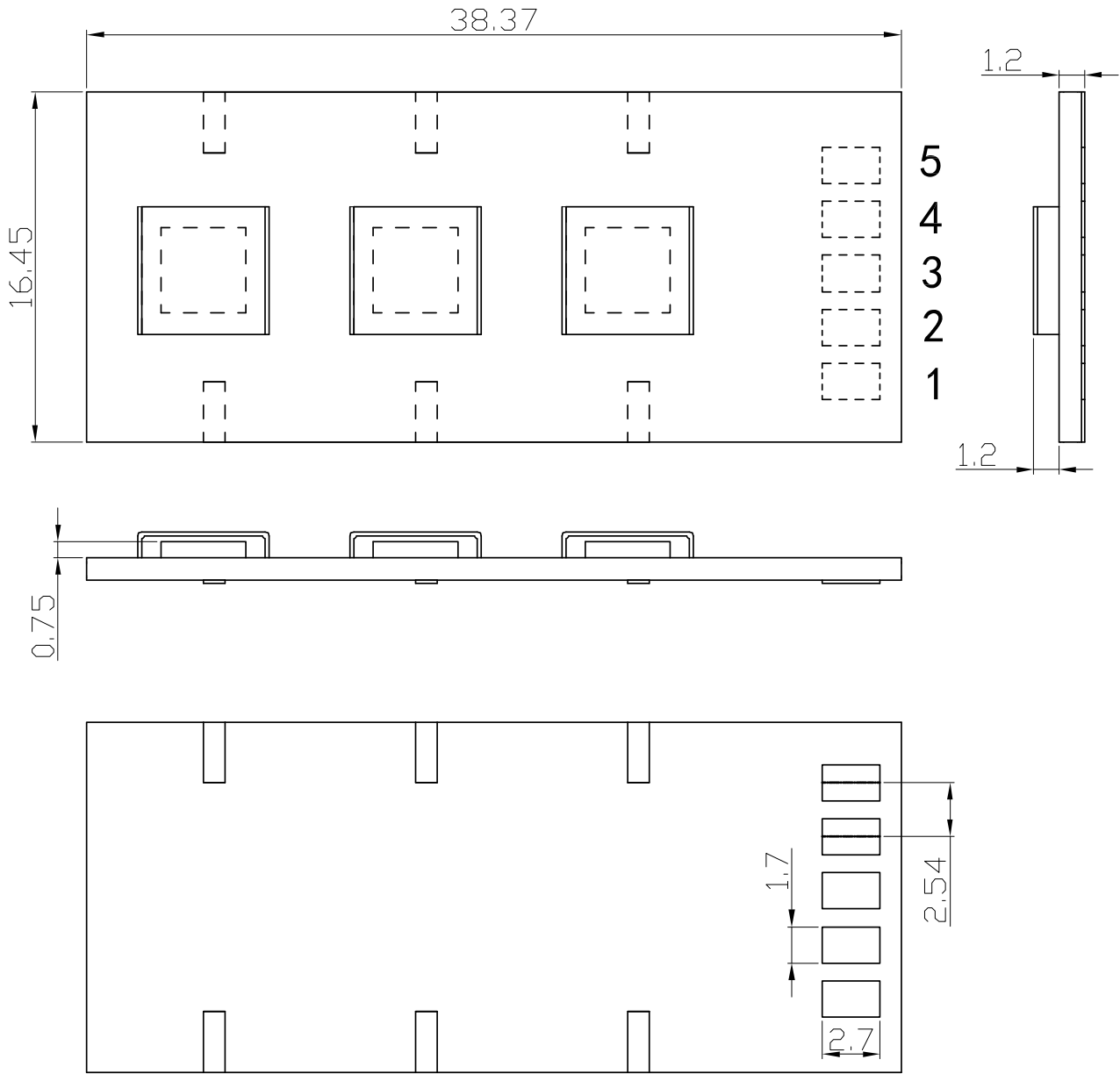
4. Electrical data STK-6TP25

Condition: $T_A = 25^\circ\text{C}$, $V_{cc} = 5\text{V}$

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_{pn}	A		25		
Primary current measuring range	I_{pm}	A	25		25	
Supply voltage	V_{cc}	V		5		+/-5%
Current consumption	I_{cc}	mA		12	20	
Rated output voltage	V_{FS}	V		2		($V_{out} @ \pm I_{pn}$) - V_{off}
Internal output resistance	R_{out}	Ω		1		V_{out}
Quiescent voltage	V_{off}	V		2.5		$V_{out} @ 0\text{ A}$
Theoretical gain	G_{th}	mV/A		80		2 V @ I_{pn}
Error of gain	Err_G	% G_{th}	-1		1	Trimmed in the factory @ 25°C
Rated linearity error	Non-L	% I_{pn}		1		$\pm I_{pn}$
Step response time	t_{res}	μs		1	1.5	@90% of I_{pn}
Frequency bandwidth (-3dB)	BW	kHz		120		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	V_{noise}	mVpp		15 30		
Accuracy @ 25°C	X	% of I_{pn}		± 1.5		@ 25°C
Accuracy @ $-40^\circ\text{C} \sim 105^\circ\text{C}$	X_{TRange}	% of I_{pn}	-3.5		3.5	$-40^\circ\text{C} \sim 105^\circ\text{C}$



5. Dimension & Pin definitions of STK-6TP05

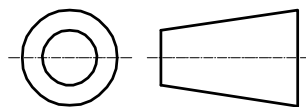


Terminals

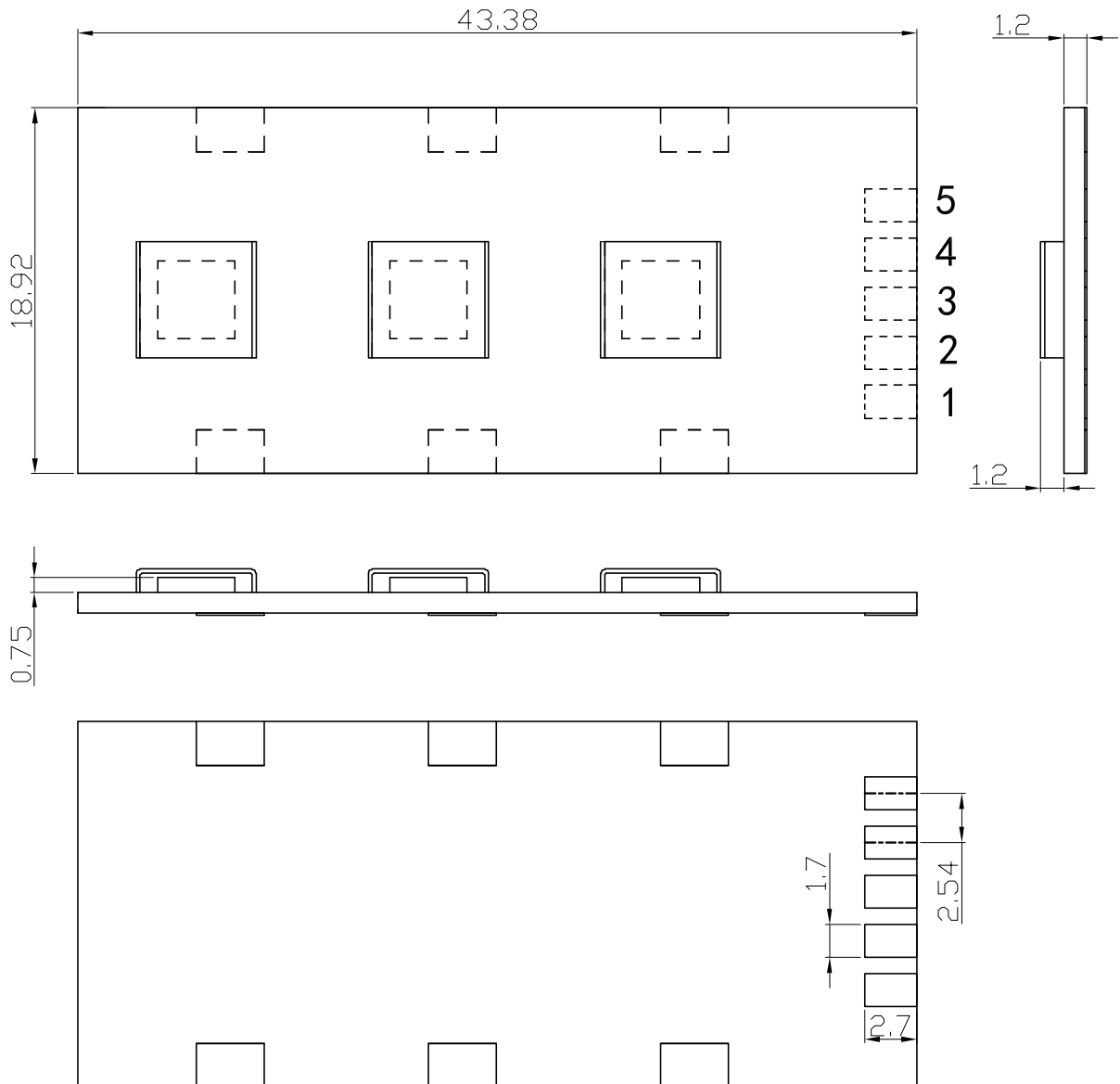
1	VCC
2	GND
3	VOUT1
4	VOUT2
5	VOUT3

General tolerance : ± 0.2

Unit :mm



6. Dimension & Pin definitions of STK-6TP15 & STK-6TP25

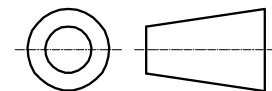


Terminals

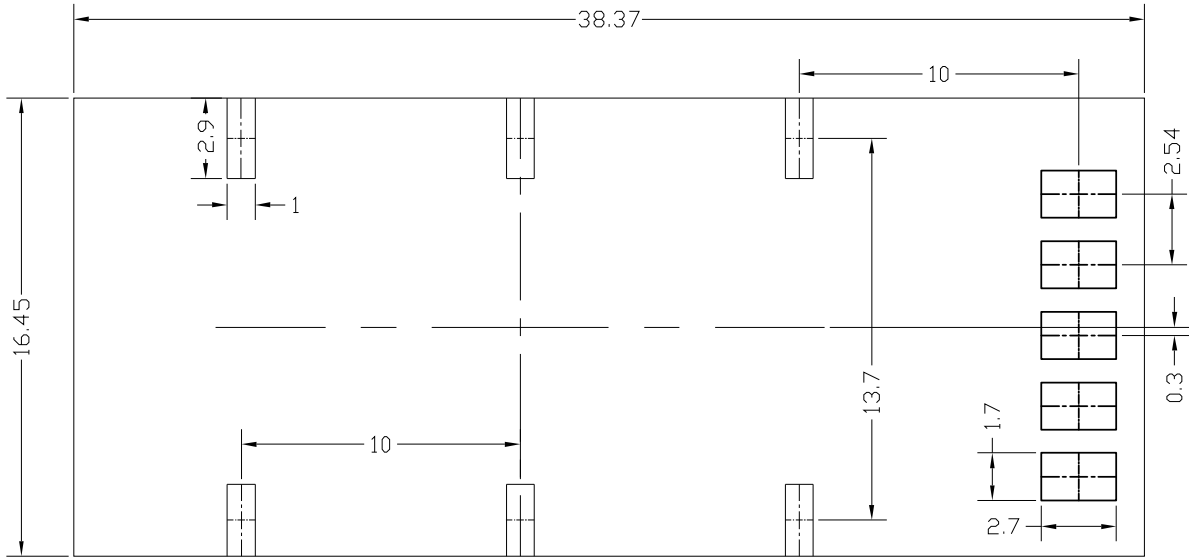
1	VCC
2	GND
3	VOUT1
4	VOUT2
5	VOUT3

General tolerance : ± 0.2

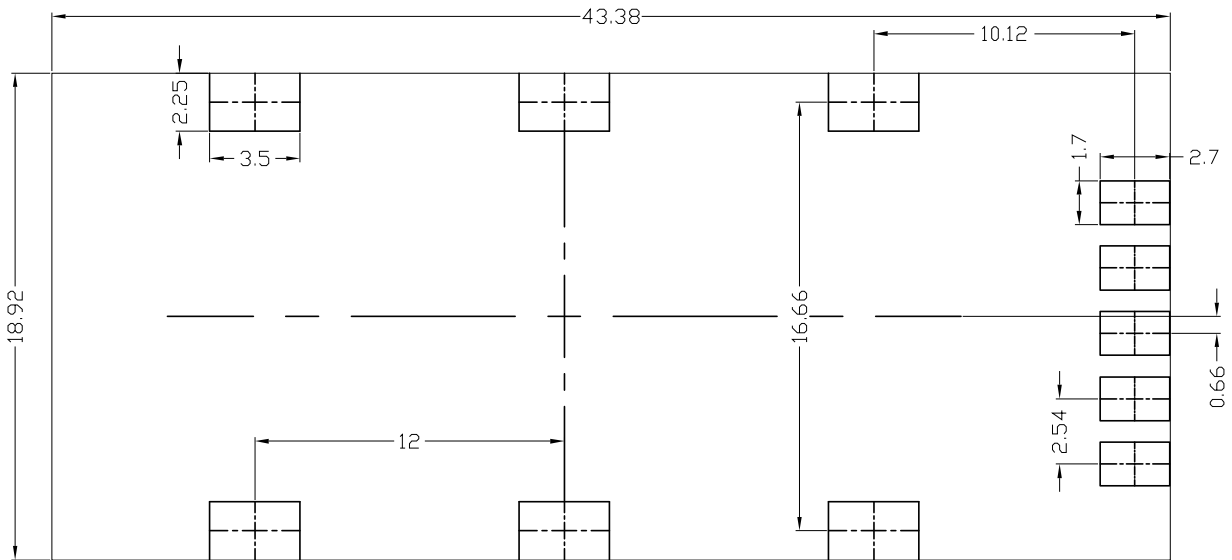
Unit :mm



7. Footprint of STK-6TPxx

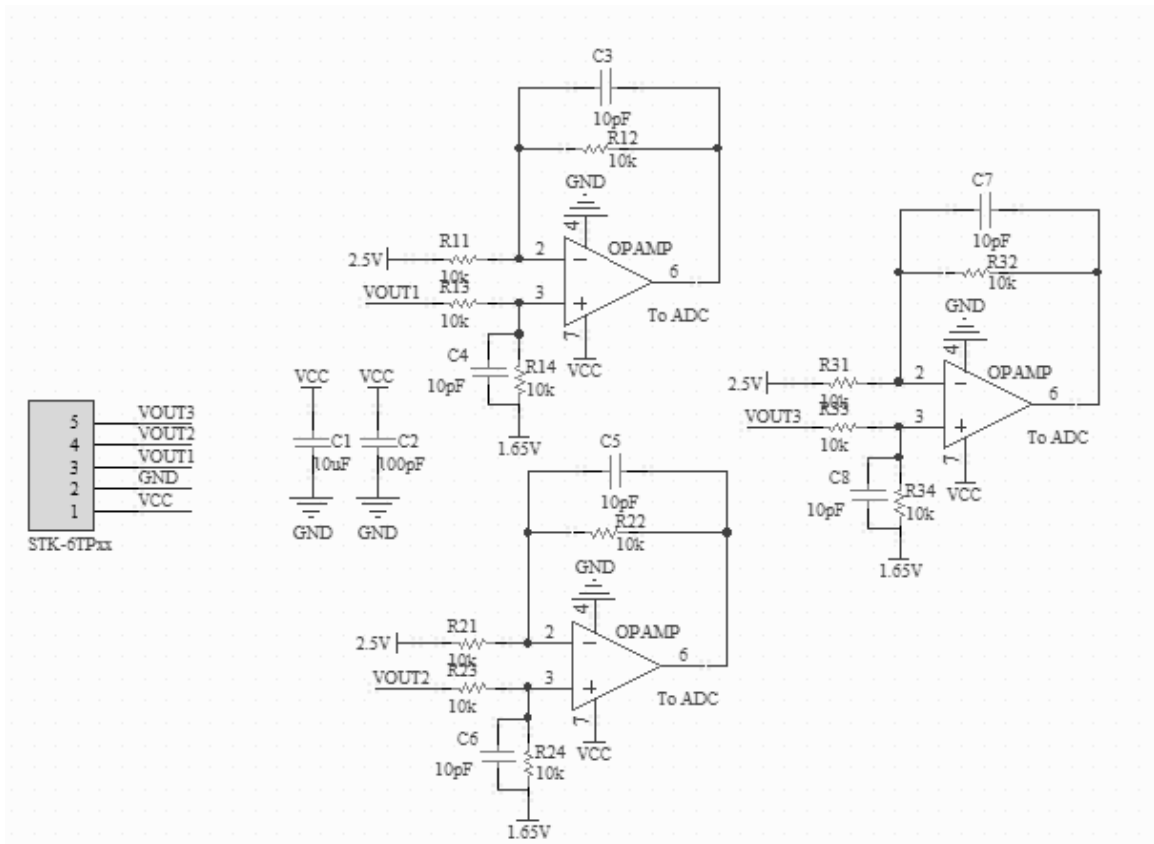


STK-6TP05



STK-6TP15 & STK-6TP25

8. Typical Application of STK-6TPxx



R12 (ohm)	C3 (nF)	Theoretical -3dB $f = 1/(2\pi RC)$ (kHz)	Measured -3dB (kHz)
100	1	1592	~ 100
240	4.7	141	~ 100
2000	9.4	8	~ 10

The frequency characteristics of STK-6TPxx series current sensor are not affected by the R-C setting (according to recommended R-C setting), therefore the active filter circuit or R-C circuit can be applied to modulate the sensor's frequency characteristics.

The signal input to ADC is $1.65 + R12/R11 * (Vout - 2.5)$ with the below conditions:
 $R11 = R13, R12 = R14, C3 = C4$.