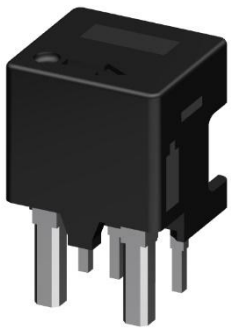
Current Sensor

Product Series:	SHK-VBS-S1
Part number:	SHK-VBS-S1-20AC SHK-VBS-S1-40AC
Version:	Ver 3.3



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CONTENT

1. Description

The SHK-VBS-S series current sensor is based on HALL technology and open-loop design. It is suitable for DC, AC, pulsed and any kind of irregular current measurement under the isolated conditions.

Typical applications

- Motor driver unit
- Power supply
- Inverter

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	℃	-40 ~ 125
Storage temperature	T_stg	℃	-40 ~ 125
Mass	m	g	0.1

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	Vcc	V	3.3
ESD rating（HBM）	U_ESD	kV	2

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 50 Hz, 1 min	Ud	V	200	Pollution degree 2
Clearance distance (pri. -sec)	dCl	mm	1	After soldered on PCB
Creepage distance (pri. -sec)	dCp	mm	1	

Measuring current table

Part number	Norminal Current	Measuring Range	Sensitivity (mV/A)	T (℃)
SHK-VBS-S1-20AC	±20 A	±62.5 A	24	-40 ~ 105
SHK-VBS-S1-40AC	±40 A	±125 A	12	-40 ~ 105

Note:

The measuring range can be reached with a Vcc of not less than 3.3 V. Otherwise, the measuring range will be calculated as (Vcc - 0.15 V) / Sensitivity.

2. Electrical data

Condition: T_A = 25℃, Vcc = 3.3 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Nominal current range	I_pn	A	-20		20	SHK-VBS-S1-20AC
			-40		40	SHK-VBS-S1-40AC
Measuring current range	I_pm	A	-62.5		62.5	SHK-VBS-S1-20AC
			-125		125	SHK-VBS-S1-40AC
Supply voltage	Vcc	V		3.3		±5%
Current consumption	Icc	mA		7	12	
Full scale voltage	V_FS	V		1.5		Output @ I_pm
Theoretical gain	G	mV/A		24		SHK-VBS-S1-20AC
				12		SHK-VBS-S1-40AC
Gain Error @ 25℃	G_error	% of Gain	-1		1	@ 25℃
Gain Error @ -40℃~105℃	G_error_T	% of Gain	-1.5		1.5	@ -40℃~105℃
Primary conductor resistance	R_IP	mΩ		0.25		
Offset voltage	Voff	V	1.6	1.65	1.7	
Reference voltage	Vref	V	1.6	1.65	1.7	Out function
Quiescent voltage Error	Voe	mV	-20		20	Voff - Vref
Internal output resistance	R_out	Ω	1	15	30	
Internal Vref resistance	R_ref	Ω	1	15	30	
Step response time	t_res	μs		10		TBD
Frequency bandwidth (-3dB)	BW	kHz		25		TBD
Noise (r.m.s)	I_noise	%I_pm		1		10 ~ 50 kHz
Non-linearity @ 25℃	ξ	%		±1.5		% of I_pm
Accuracy @ 25℃①	X	% of I_pn	-2		2	@ 25℃
Accuracy @ -40℃~105℃②	X_TRang	% of I_pn	-3		3	@ -40℃~105℃
Thermal drift of Gain	Gain_T	% of Gain	-1.5		1.5	Drift value related to R.T. over -40 ℃ ~105℃
Thermal drift of Voff	Voff_T	mV	-15		15	

Remarks:

①. Accuracy @ 25℃,X = ((Vout @ In @ 25℃) – (G_fit * In+Voff @ 25℃)) / V_FS , Here In is the current test current. G_fit is the normal temperature fitting gain , Voff @ 25℃ is the calibrated offset.

②. Accuracy,X_TRange = ((Vout @ In @ T_x) – (G_fit@25℃ * In+Voff @ 25℃)) / V_FS , The fitting gain of the product at G_fit@25 ℃ is 25 ℃.

3. Output voltage VS primary current of SHK-VBS-S1

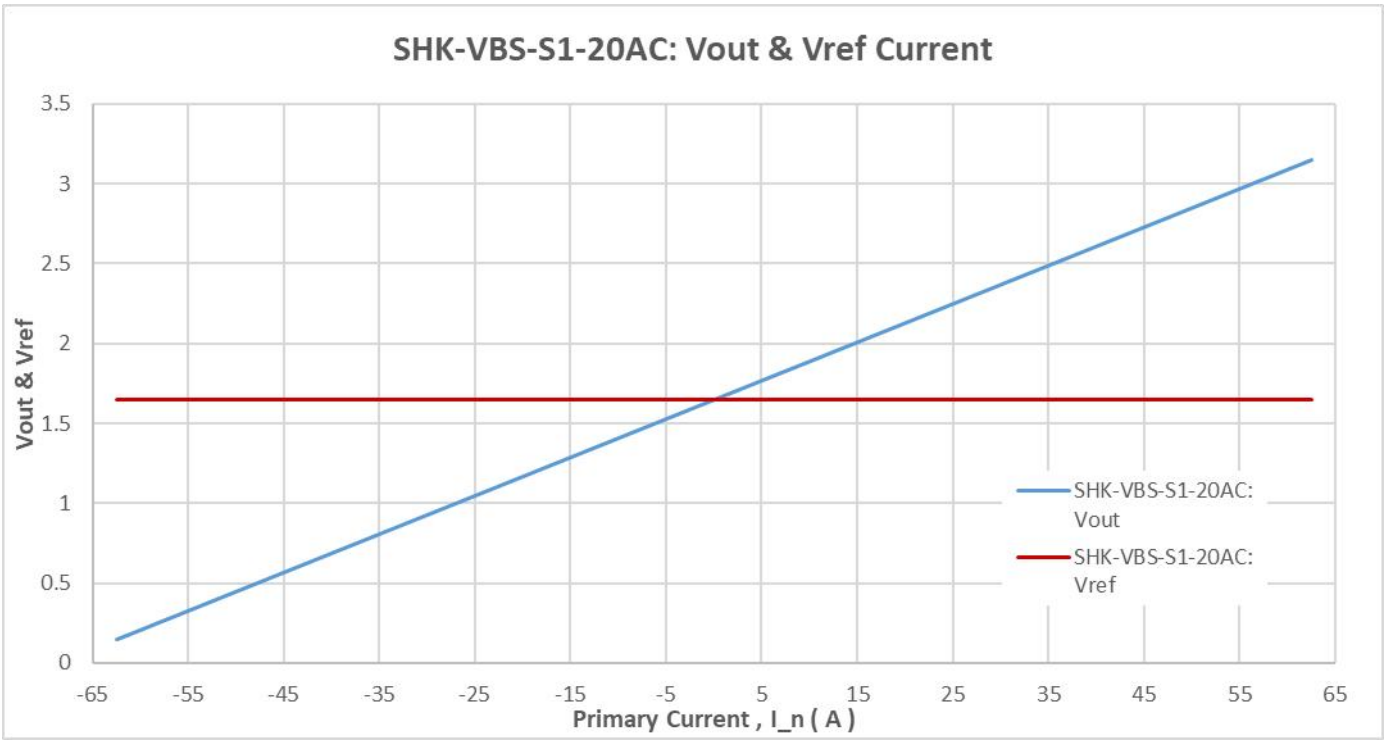


Fig.1 The dependence of Vout&Vref of SHK-VBS-S1-20AC on the primary current.

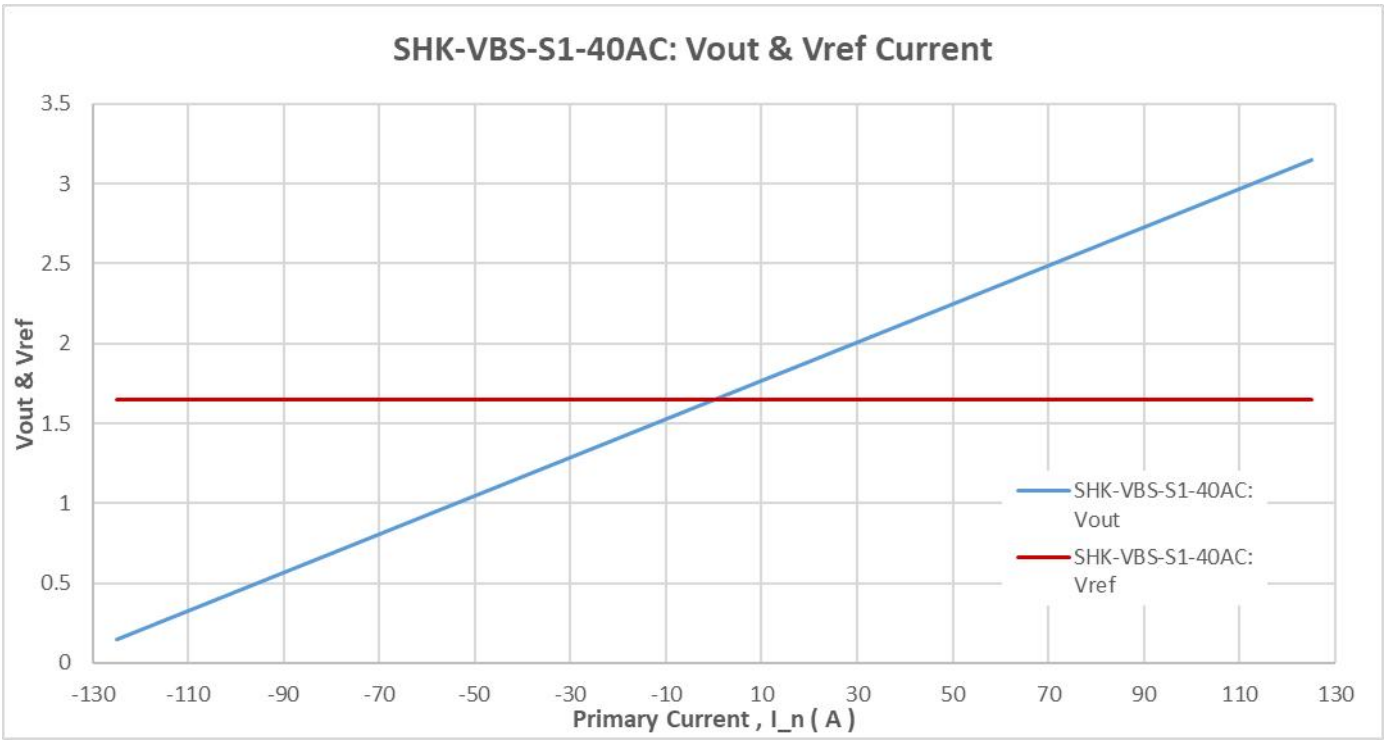


Fig.2 The dependence of Vout&Vref of SHK-VBS-S1-40AC on the primary current.

4. Maximum continuous DC current

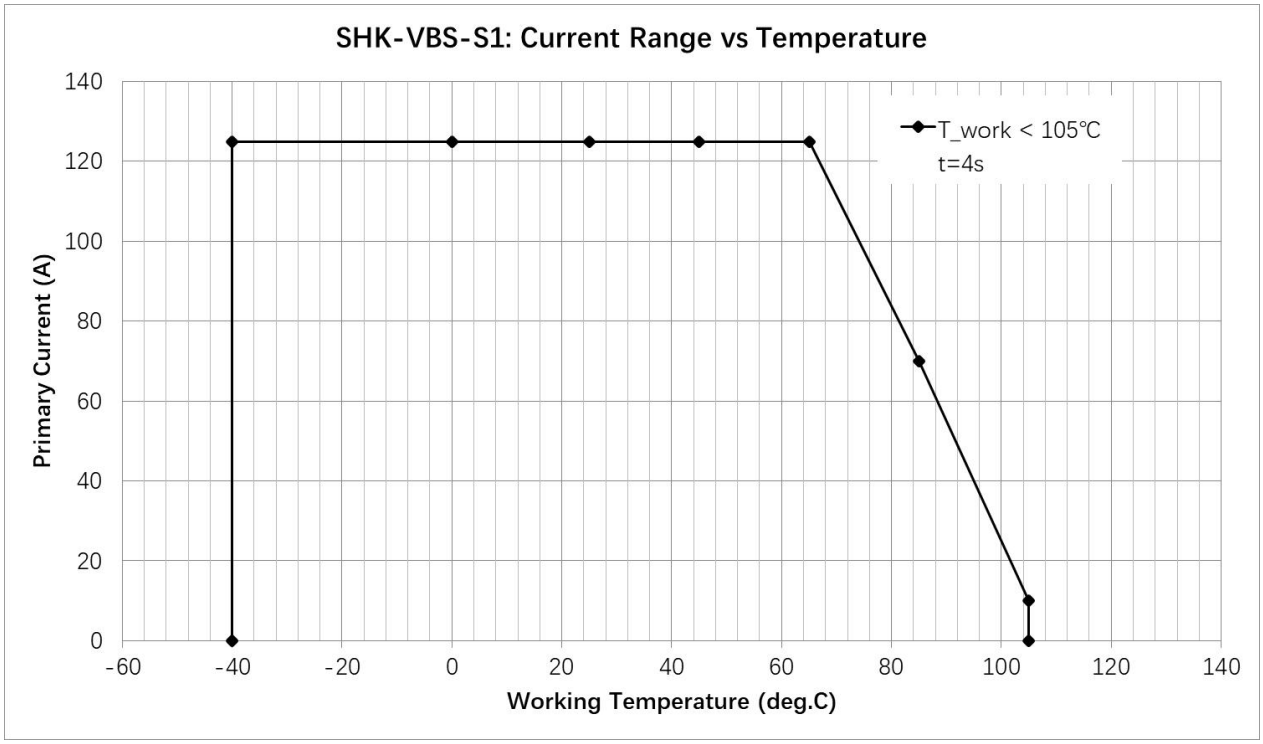


Fig.3 The derating spec of SHK-VBS-S1 on the overload current.

5. Frequency band width

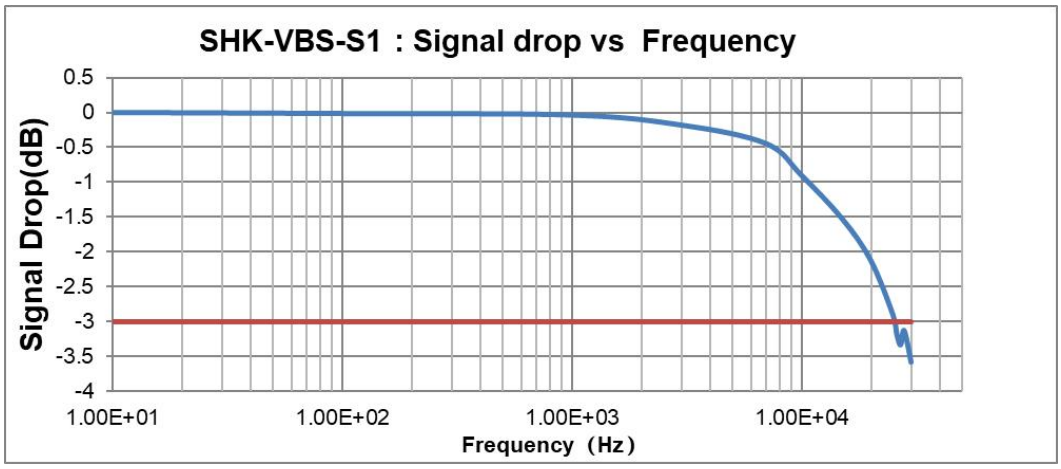


Fig.4 The frequency band width of SHK-VBS-S1 series current sensors.

6. Step response time

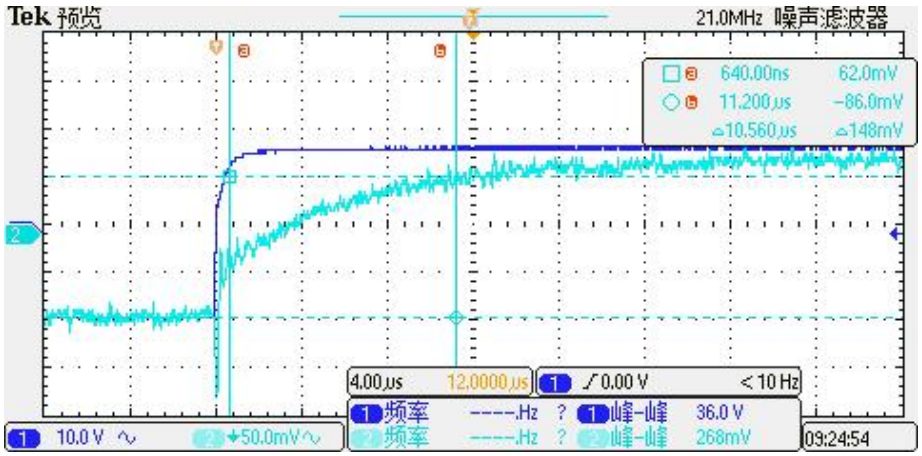


Fig.5 The step response time of SHK-VBS-S1 current sensors. The dark light blue is primary current, while the light blue is output signal of current sensor. The step response time is about 10 µs.

7. Delay time

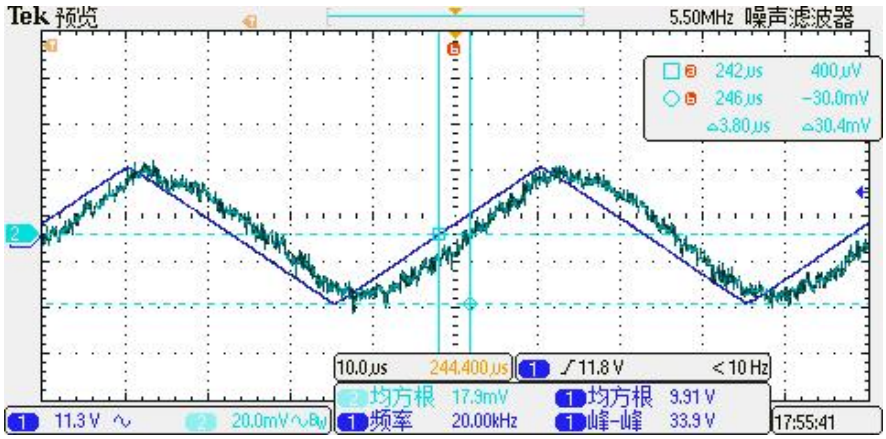
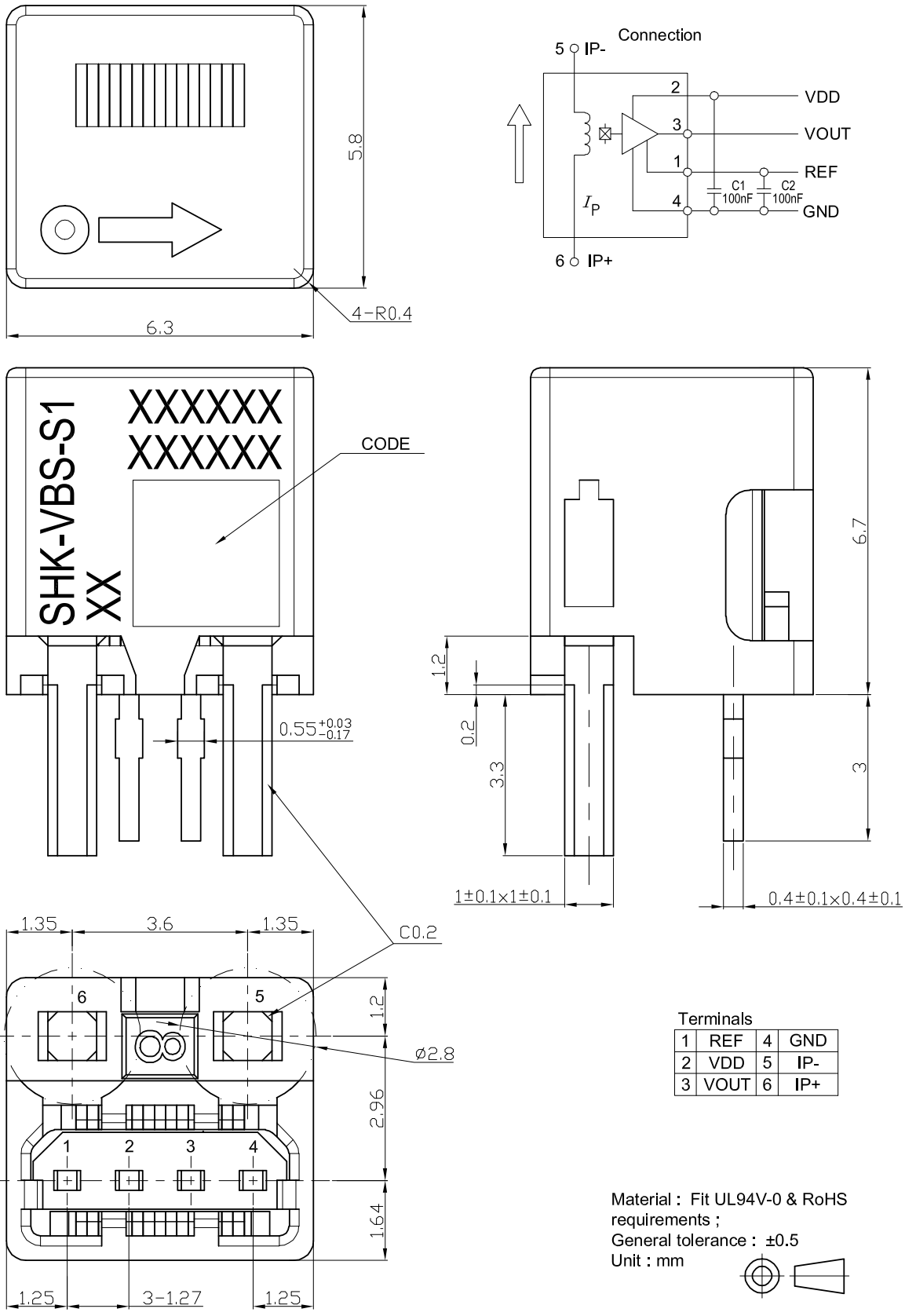


Fig.6 when detection the primary current with a frequency of 20 kHz. The typical results of the output of SHK-VBS-S1 current sensor on the primary current delay characteristics. The response time is about 3.84 µs.

8. Dimensions & Pin Definition



Terminals

1	REF	4	GND
2	VDD	5	IP-
3	VOUT	6	IP+

Material : Fit UL94V-0 & RoHS requirements ;
General tolerance : ±0.5
Unit : mm

9. PCB layout recommendation