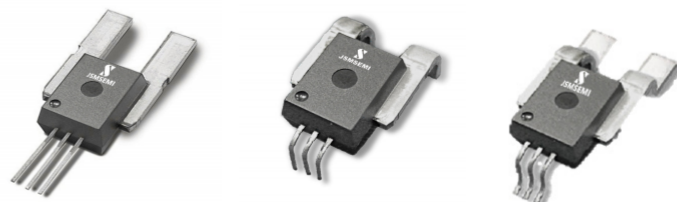


DESCRIPTION

The ACS772 series is an open-loop Hall current sensing chip that combines high accuracy, high band width, high response, high linearity, and low temperature drift. ACS772 provides 0~200A large current measurement range. ACS772 can also do -40°C~125°C full temperature range of typical sensitivity temperature drift $\pm 0.2\%$ of the performance indicators. It provides a new solution for the high accuracy and high performance current sensor area.

ACS772 adapts to strong electromagnetic and high isolation current detection environment. In addition, ACS772 series products have passed CE, TUV and other certifications.



PSS

PFF

SMT

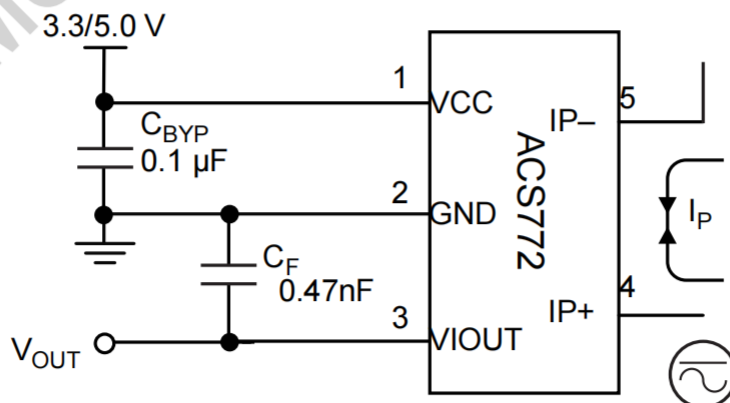
FEATURES

- ◆ High Accuracy, Large Current
- ◆ 0~400A Current sensor
- ◆ Offset temperature drift: $\pm 5\text{mV}$
- ◆ Sensitivity total output error: $\pm 1\%$
- ◆ Typical sensitivity temperature drift: $\pm 0.2\%$
- ◆ Typical linearity error: $\pm 0.2\%$
- ◆ High Bandwidth, Fast Response
- ◆ Typical bandwidth: 250kHz Typical
- ◆ response time: 1.5 μs
- ◆ High Anti-interference, High Isolation
- ◆ The integrated magnetic core resists stray magnetic field interference.
- ◆ Isolated voltage: 5000Vrms

TYPICAL APPLICATIONS

- ◆ Photovoltaic Inverter
- ◆ Industrial Inverter
- ◆ Commercial Air Conditioning
- ◆ Charging Station
- ◆ Welding Machine
- ◆ Balancing Car
- ◆ UPS

TYPICAL APPLICATION CIRCUIT



SELECTION GUIDE

Part Number	Output Mode	I _{PR} (A)	Sensitivity (mV/A)		Lead Form	Operating Temperature	Packing
			*=3	*=5			
ACS772LCB-050U-PFF-T	Ratiometric Output Mode	50	52.8	80	PFF	-40°C ~ 125°C	34/40 pieces per tube
ACS772LCB-050U-PSS-T					PSS		
ACS772LCB-050U-SMT-T					SMT		
ACS772LCB-050B-PFF-T		±50	26.4	40	PFF		
ACS772LCB-050B-PSS-T					PSS		
ACS772LCB-050B-SMT-T					SMT		
ACS772LCB-100U-PFF-T		100	26.4	40	PFF		
ACS772LCB-100U-PSS-T					PSS		
ACS772LCB-100U-SMT-T					SMT		
ACS772LCB-100B-PFF-T		±100	13.2	20	PFF		
ACS772LCB-100B-PSS-T					PSS		
ACS772LCB-100B-SMT-T					SMT		
ACS772KCB-150U-PFF-T		150	17.6	26.66	PFF		
ACS772KCB-150U-PSS-T					PSS		
ACS772KCB-150U-SMT-T					SMT		
ACS772KCB-150B-PFF-T		±150	8.8	13.33	PFF		
ACS772KCB-150B-PSS-T					PSS		
ACS772KCB-150B-SMT-T					SMT		
ACS772ECB-200U-PFF-T		200	13.2	20	PFF	-40°C ~ 85°C	
ACS772ECB-200U-PSS-T					PSS		
ACS772ECB-200U-SMT-T					SMT		
ACS772ECB-200B-PFF-T		±200	6.6	10	PFF		
ACS772ECB-200B-PSS-T					PSS		
ACS772ECB-200B-SMT-T					SMT		
ACS772ECB-250U-PFF-T		250	10.56	16	PFF		
ACS772ECB-250U-PSS-T					PSS		
ACS772ECB-250U-SMT-T					SMT		
ACS772ECB-250B-PFF-T		±250	5.28	8	PFF		
ACS772ECB-250B-PSS-T					PSS		
ACS772ECB-250B-SMT-T					SMT		
ACS772ECB-300U-PFF-T		300	8.8	13.33	PFF		
ACS772ECB-300U-PSS-T					PSS		
ACS772ECB-300U-SMT-T					SMT		
ACS772ECB-300B-PFF-T		±300	4.4	6.67	PFF		
ACS772ECB-300B-PSS-T					PSS		
ACS772ECB-300B-SMT-T					SMT		
ACS772ECB-400U-PFF-T		400	6.6	10	PFF		
ACS772ECB-400U-PSS-T					PSS		
ACS772ECB-400U-SMT-T					SMT		
ACS772ECB-400B-PFF-T		±400	3.3	5	PFF		
ACS772ECB-400B-PSS-T					PSS		
ACS772ECB-400B-SMT-T					SMT		

Note: Changes in ambient temperature may affect the maximum operating current of the product. For specific information, please refer to the derating curve. If you have other range requirements, please contact our sales. New range will be added without notice.

1. ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Unit	Min.	Typ.	Max.
Supply Voltage	V_{CC}	V	-0.3	/	6.5
Output Current	I_{OUTmax}	mA	-45	/	45
Proportional output	V_{OUTmax}	V	0.1	/	$V_{CC}-0.1$
Storage temperature	T_S	°C	-55	/	150
Operating Ambient Temperature	T_A	°C	-40	/	125
Maximum Junction Temperature	T_{Jmax}	°C	/	/	165

Note: Operation outside the absolute maximum ratings may cause permanent device damage. Absolute maximum ratings do not imply functional operation of the device at these or any other conditions beyond those listed under recommended operating conditions. If used outside the recommended operating conditions but within the absolute maximum ratings, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.

2. ESD RATINGS

Characteristic	Symbol	Unit	Notes	Value
Human Body Model	V_{HBM}	kV	ESD between any two pins	±6
Charged Device Model	V_{CDM}	kV		±1

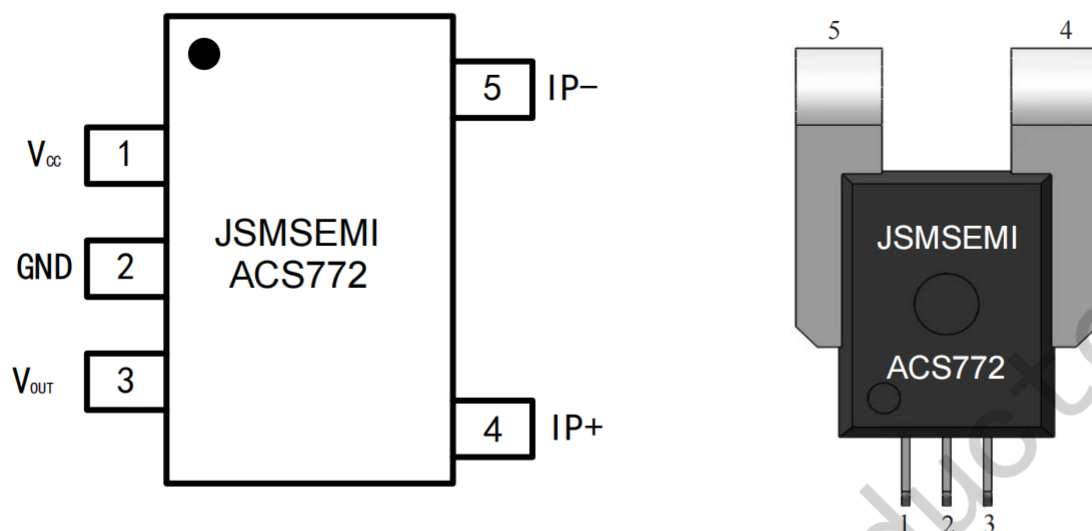
3. ISOLATION CHARACTERISTICS

Characteristic	Symbol	Unit	Notes	Value
Dielectric Surge Voltage	V_{SURGE}	V	Test method refers to IEC61000-4-5, 1.2μs/50μs waveform.	8000
Dielectric Strength Test Voltage	V_{ISO}	V_{RMS}	60s, 50Hz isolation withstand voltage parameters, according to UL62368-1, test 6kV/1s before delivery to verify the insulation performance, and verify the partial discharge is less than 5pc.	5000
Working Voltage for Basic Isolation	V_{WVBI}	V_{PK} or V_{CC}	Maximum approved working voltage for basic (single) isolation according to UL 60950-1 (edition 2).	1800
		V_{RMS}		1272
Working Voltage for Reinforced Isolation	V_{WVRI}	V_{PK} or V_{CC}	Maximum approved working voltage for reinforced isolation according to UL 60950-1 (edition 2).	900
		V_{RMS}		636

4. TYPICAL OVERCURRENT CAPABILITY

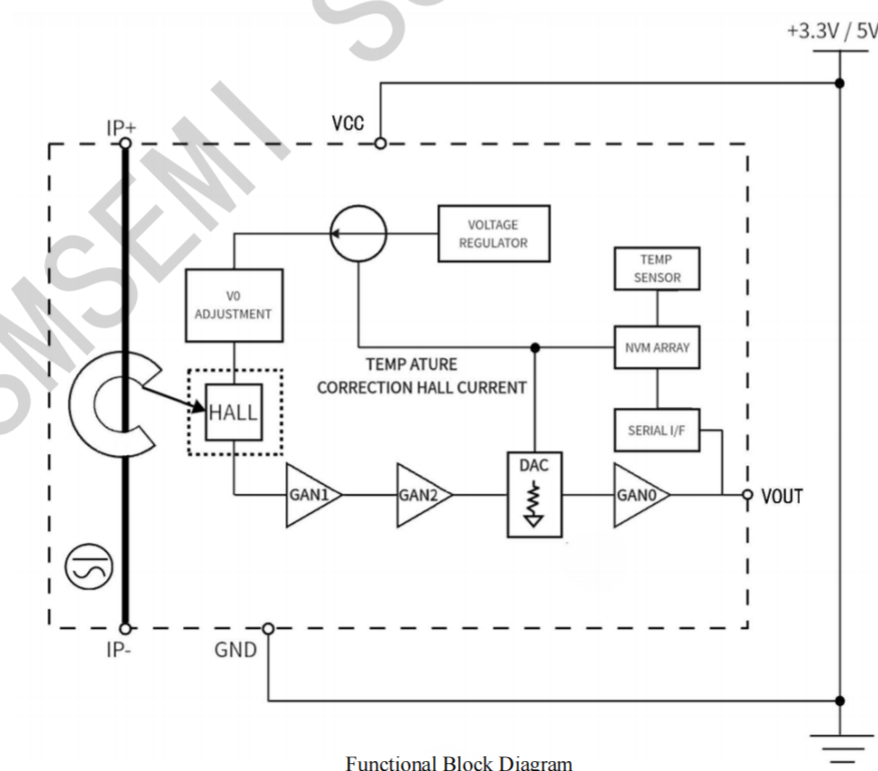
Characteristic	Symbol	Unit	Notes	Value
Maximum Current Test	I_{POC}	A	$T_A=25^{\circ}C$, Current On 1s, off 99s, Apply 100 pulses	1200
			$T_A=85^{\circ}C$, Current On 1s, off 99s, Apply 100 pulses	900
			$T_A=125^{\circ}C$, Current On 1s, off 99s, Apply 100 pulses	600

5. PINOUT DIAGRAM & FUNCTIONAL BLOCK DIAGRAM



Number	Name	Description
PIN1	VCC	Device power supply terminal pin
PIN2	GND	Device ground terminal pin
PIN3	VOUT	Analog output signal pin
PIN4	IP+	Current flows into the chip, positive direction
PIN5	IP-	Current flows out of the chip, negative direction

Pinout Diagram



Functional Block Diagram

6.ELECTRICAL CHARACTERISTICS

$T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}/3.3\text{V}$, $C_L=0.47\text{nF}$, $C_{VCC}=100\text{nF}$ (Unless otherwise noted)

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Rated Current	I_{PN}	A	ACS772LCB-050U-XXX-T	0	/	50
			ACS772LCB-050B-XXX-T	-50	/	50
			ACS772LCB-100U-XXX-T	0	/	100
			ACS772LCB-100B-XXX-T	-100	/	100
			ACS772KCB-150U-XXX-T	0	/	150
			ACS772KCB-150B-XXX-T	-150	/	150
			ACS772ECB-200U-XXX-T	0	/	200
			ACS772ECB-200B-XXX-T	-200	/	200
			ACS772ECB-250U-XXX-T	0	/	250
			ACS772ECB-250B-XXX-T	-250	/	250
			ACS772ECB-300U-XXX-T	0	/	300
			ACS772ECB-300B-XXX-T	-300	/	300
			ACS772ECB-400U-XXX-T	0	/	400
			ACS772ECB-400B-XXX-T	-400	/	400
Supply Voltage	V_{CC}	V	*=3	3	3.3	3.6
			*=5	4.5	5	5.5
Supply Current ^{Note1}	I_{CC}	mA	*=3	6	6.5	12
			*=5	6	7.5	12
Primary Conductor Resistance ^{Note1}	R_P	m Ω	/	/	0.1	/
Power-On Time ^{Note2}	T_{PO}	ms	Chip power-on ($V_{CC}>3.0\text{V}$), V_{OUT} stable time	/	1	/
Rise time	T_R	μs	/	/	1	/
Propagation Delay	T_{PROP}	μs	/	/	0.5	/
Response Time	$T_{RESPONSE}$	μs	/	/	1.5	/
Output Capacitive Load ^{Note2}	C_L	nF	$V_{OUT}-V_{GND}$	/	0.47	10
Output Resistive Load ^{Note2}	R_L	k Ω	/	4.7	/	/
DC Output Resistance ^{Note2}	R_{OUT}	Ω	/	/	1	/
Undervoltage-Lockout ^{Note1}	V_{UVLOD}	V	Undervoltage protection rising threshold	/	2.3	/
	V_{UVLOE}	V	Undervoltage protection drop threshold	/	2.1	/
Undervoltage-Lockout ^{Note1}	T_{UVLOD}	μs	Undervoltage protection rise time	/	500	/
	T_{UVLOE}	μs	Undervoltage protection drop time	/	50	/
Output Current Capability	I_{SINK}	mA	Sink current of output Pin	/	50	/
	I_{SOURCE}	mA	Source current of output Pin	/	55	/
Output Voltage Range	V_S	V	$R_L=10\text{k}\Omega$ to V_{CC} or GND	0.1	/	$V_{CC}-0.1$
Internal Bandwidth	BW_I	kHz	200A range, small signal measurement	/	250	/
Sensitivity Symmetry Error	E_{SYM}	%	/	-0.1	± 0.01	0.1
Ratiometric Output Sensitivity Error ^{Note1}	S_{ERR}	%	$V_{CC}=3.15\sim 3.45\text{V}$	-0.5	0	0.5
			$V_{CC}=4.75\sim 5.25\text{V}$	-0.5	0	0.5
Nonlinearity ^{Note1}	E_{LIN}	%	$\leq 100\text{A}$	-0.1	0.03	0.1
			$\leq 200\text{A}$	-0.2	0.05	0.2
Sensitivity Temperature Drift ^{Note1}	dS_{ERR}	%	$T_A=85^{\circ}\text{C} \sim 125^{\circ}\text{C}$	-1.0	± 0.2	1.0
			$T_A=25^{\circ}\text{C} \sim 85^{\circ}\text{C}$	-0.8	± 0.2	0.8
			$T_A=-40^{\circ}\text{C} \sim 25^{\circ}\text{C}$	-1.0	± 0.2	1.0
Offset Temperature Drift ^{Note1}	$V_{IOUT(Q)TC}$	mV	$T_A=25^{\circ}\text{C} \sim 125^{\circ}\text{C}$	-5	/	5
			$T_A=-40^{\circ}\text{C} \sim 25^{\circ}\text{C}$	-5	/	5

Note1: These parameters are obtained from laboratory testing with 3σ data.

Note2: These parameters are guaranteed by design.

ACS772LCB-050U-XXX-T/ACS772LCB-050B-XXX-T PERFORMANCE CHARACTERISTICS
 $T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}/3.3\text{V}$, $C_1=0.47\text{nF}$, $C_{VCC}=100\text{nF}$ (Unless otherwise noted)

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ. ^{Note1}	Max.
NOMINAL PERFORMANCE						
Sensitivity(V _{CC} =3.3V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-050U-XXX-T	/	V _{CC} *52.8 /3.3	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-050B-XXX-T	/	V _{CC} *26.4 /3.3	/
Sensitivity(V _{CC} =5V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-050U-XXX-T	/	V _{CC} *80/5	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-050B-XXX-T	/	V _{CC} *40/5	/
Zero Current Output Voltage	V _{IOUT(Q)}	V	Unipolar, I _{PR} =0A	/	V _{CC} *0.1	/
			Bipolar, I _{PR} =0A	/	V _{CC} *0.5	/
ACCURACY PERFORMANCE						
Noise	V _N	mVrms	/	/	7	/
Magnetic Offset Error	I _{ERROM}	mV	I _P =0A, I _{PRmax}	/	0.4	/
		mA	I _P =0A, I _{PRmax}	/	10	/
Total Output Error	E _{TOT}	%	I _P =I _{PRmax} , T _A =-40°C ~ 125°C	-1	±0.2	1
TOTAL OUTPUT ERROR COMPONENTS: E _{TOT} = (V _{IOUT} -V _{IOUT Ideal})/(Sens _{ideal} ×I _P)×100%						
Sensitivity Error	E _{SENS}	%	I _P =I _{PRmax} , T _A =25°C ~ 125°C	-0.5	±0.2	0.5
Offset Error	V _{OE}	mV	I _P =0A, T _A =25°C ~ 125°C	-10	±0.2	10
			I _P =0A, T _A =25°C	-5	±0.2	5
			I _P =0A, T _A =-40°C ~ 125°C	-10	±0.2	10
LIFETIME DRIFT CHARACTERISTICS						
Sensitivity Error Lifetime Drift	E _{SENS_drift}	%	After reliability test, T _A =25°C	/	±0.5	/
Total Output Error Lifetime Drift	E _{TOT_drift}	%	After reliability test, T _A =25°C	/	±0.5	/

 Note: These parameters are obtained from laboratory testing with 3 σ data.

ACS772LCB-100U-XXX-T/ACS772LCB-100B-XXX-T PERFORMANCE CHARACTERISTIC
 $T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}/3.3\text{V}$, $C_1=0.47\text{nF}$, $C_{VCC}=100\text{nF}$ (Unless otherwise noted)

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ. ^{Note1}	Max.
NOMINAL PERFORMANCE						
Sensitivity(V _{CC} =3.3V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-100U-XXX-T	/	V _{CC} *26.4 /3.3	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-100B-XXX-T	/	V _{CC} *13.2 /3.3	/
Sensitivity(V _{CC} =5V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-100U-XXX-T	/	V _{CC} *40/5	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772LCB-100B-XXX-T	/	V _{CC} *20/5	/
Zero Current Output Voltage	V _{IOUT(Q)}	V	Unipolar, I _{PR} =0A	/	V _{CC} *0.1	/
			Bipolar, I _{PR} =0A	/	V _{CC} *0.5	/
ACCURACY PERFORMANCE						
Noise	V _N	mVrms	/	/	5	/
Magnetic Offset Error	I _{ERROM}	mV	I _P =0A, I _{PRmax}	/	0.6	/
		mA	I _P =0A, I _{PRmax}	/	30	/
Total Output Error	E _{TOT}	%	I _P =I _{PRmax} , T _A =-40°C ~ 125°C	-1	±0.2	1
TOTAL OUTPUT ERROR COMPONENTS: E _{TOT} = (V _{IOUT} -V _{IOUT Ideal})/(Sens _{ideal} ×I _P)×100%						
Sensitivity Error	E _{SENS}	%	I _P =I _{PRmax} , T _A =25°C ~ 125°C	-0.5	±0.2	0.5
Offset Error	V _{OE}	mV	I _P =0A, T _A =25°C ~ 125°C	-10	±0.2	10
			I _P =0A, T _A =25°C	-5	±0.2	5
			I _P =0A, T _A =-40°C ~ 125°C	-10	±0.2	10
LIFETIME DRIFT CHARACTERISTICS						
Sensitivity Error Lifetime Drift	E _{SENS_drift}	%	After reliability test, T _A =25°C	/	±0.5	/
Total Output Error Lifetime Drift	E _{TOT_drift}	%	After reliability test, T _A =25°C	/	±0.5	/

 Note: These parameters are obtained from laboratory testing with 3σ data.

ACS772KCB-150U-XXX-T/ACS772KCB-150B-XXX-T PERFORMANCE CHARACTERISTIC
 $T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}/3.3\text{V}$, $C_1=0.47\text{nF}$, $C_{VCC}=100\text{nF}$ (Unless otherwise noted)

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ. ^{Note1}	Max.
NOMINAL PERFORMANCE						
Sensitivity(V _{cc} =3.3V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772KCB-150U-XXX-T	/	V _{cc} *17.6 /5	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772KCB-150B-XXX-T	/	V _{cc} *8.8 /5	/
Sensitivity(V _{cc} =5V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772KCB-150U-XXX-T	/	V _{cc} *26.66 /5	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772KCB-150B-XXX-T	/	V _{cc} *13.33 /5	/
Zero Current Output Voltage	V _{IOUT(Q)}	V	Unipolar, I _{PR} =0A	/	V _{cc} *0.1	/
			Bipolar, I _{PR} =0A	/	V _{cc} *0.5	/
ACCURACY PERFORMANCE						
Noise	V _N	mVrms	/	/	4	/
Magnetic Offset Error	I _{ERROM}	mV	I _P =0A, I _{PRmax}	/	0.8	/
		mA	I _P =0A, I _{PRmax}	/	60	/
Total Output Error	E _{TOT}	%	I _P =I _{PRmax} , T _A =-40°C ~ 125°C	-1	±0.2	1
TOTAL OUTPUT ERROR COMPONENTS: E _{TOT} = (V _{IOUT} -V _{IOUT Ideal})/(Sens _{ideal} ×I _P)×100%						
Sensitivity Error	E _{SENS}	%	I _P =I _{PRmax} , T _A =25°C ~ 125°C	-0.5	±0.2	0.5
Offset Error	V _{OE}	mV	I _P =0A, T _A =25°C ~ 125°C	-10	±0.2	10
			I _P =0A, T _A =25°C	-5	±0.2	5
			I _P =0A, T _A =-40°C ~ 125°C	-10	±0.2	10
LIFETIME DRIFT CHARACTERISTICS						
Sensitivity Error Lifetime Drift	E _{SENS_drift}	%	After reliability test, T _A =25°C	/	±0.5	/
Total Output Error Lifetime Drift	E _{TOT_drift}	%	After reliability test, T _A =25°C	/	±0.5	/

 Note: These parameters are obtained from laboratory testing with 3σ data.

ACS772ECB-200U-XXX-T/ACS772ECB-200B-XXX-T PERFORMANCE CHARACTERISTIC
 $T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}/3.3\text{V}$, $C_L=0.47\text{nF}$, $C_{VCC}=100\text{nF}$ (Unless otherwise noted)

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ. ^{Note1}	Max.
NOMINAL PERFORMANCE						
Sensitivity(V _{CC} =3.3V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772ECB-200U-XXX-T	/	V _{CC} *13.2 /3.3	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772ECB-200B-XXX-T	/	V _{CC} *6.6 /3.3	/
Sensitivity(V _{CC} =5V)	Sens	mV/A	I _{PRmin} < I _{PR} < I _{PRmax} ACS772ECB-200U-XXX-T	/	V _{CC} *20/5	/
			I _{PRmin} < I _{PR} < I _{PRmax} ACS772ECB-200B-XXX-T	/	V _{CC} *10/5	/
Zero Current Output Voltage	V _{IOUT(Q)}	V	Unipolar, I _{PR} =0A	/	V _{CC} *0.1	/
			Bipolar, I _{PR} =0A	/	V _{CC} *0.5	/
ACCURACY PERFORMANCE						
Noise	V _N	mVrms	/	/	3	/
Magnetic Offset Error	I _{ERROM}	mV	I _P =0A, I _{PRmax}	/	1	/
		mA	I _P =0A, I _{PRmax}	/	100	/
Total Output Error	E _{TOT}	%	I _P =I _{PRmax} , T _A =-40°C ~ 125°C	-1	±0.2	1
TOTAL OUTPUT ERROR COMPONENTS: E _{TOT} = (V _{IOUT} -V _{IOUT Ideal})/(Sens _{Ideal} ×I _P)×100%						
Sensitivity Error	E _{SENS}	%	I _P =I _{PRmax} , T _A =25°C ~ 125°C	-0.5	±0.2	0.5
Offset Error	V _{OE}	mV	I _P =0A, T _A =25°C ~ 125°C	-10	±0.2	10
			I _P =0A, T _A =25°C	-5	±0.2	5
			I _P =0A, T _A =-40°C ~ 125°C	-10	±0.2	10
LIFETIME DRIFT CHARACTERISTICS						
Sensitivity Error Lifetime Drift	E _{SENS_drift}	%	After reliability test, T _A =25°C	/	±0.5	/
Total Output Error Lifetime Drift	E _{TOT_drift}	%	After reliability test, T _A =25°C	/	±0.5	/

 Note: These parameters are obtained from laboratory testing with 3σ data.

7. PARAMETERS DESCRIPTION

7.1 Sensitivity Sens

The change in sensor IC output in response to a 1A change through the primary conductor. The sensitivity is the product of the magnetic circuit sensitivity (G/A) (1G = 0.1 mT) and the linear IC amplifier gain (mV/G). The linear IC amplifier gain is programmed at the factory to optimize the sensitivity (mV/A) for the full-scale current of the device.

7.2 Sensitivity error E_{SENS}

Sensitivity error E_{SENS} refers to the percentage deviation between the actual measured sensitivity and the ideal sensitivity.

For example, when $V_{CC} = 5V$,

$$E_{SENS} = (\text{Sens}_{\text{Meas}(5V)} - \text{Sens}_{\text{Ideal}(5V)}) / \text{Sens}_{\text{Ideal}(5V)} \times 100\%$$

7.3 The sensitivity temperature drift of dS_{ERR}

Over the entire operating temperature range is defined as:

$$dS_{ERR} = (\text{Sens}(T_A) - \text{Sens}(25^\circ\text{C})) / \text{Sens}(25^\circ\text{C}) \times 100\%$$

7.4 Saturation output voltage $V_{OUT-SAT(H/L)}$

$V_{OUT-SAT(H)}$ is the maximum output of the chip under the positive current.

$V_{OUT-SAT(L)}$ is the maximum output of the chip under negative current.

7.5 Zero current output voltage $V_{IOUT(Q)}$

$I_P = 0$, Output voltage of the sensor $V_{IOUT(Q)}$.

For bipolar devices, the output voltage $V_{IOUT(Q)} = V_{CC} \times 0.5$,

For unipolar devices, the output voltage $V_{IOUT(Q)} = V_{CC} \times 0.1$

Variation in $V_{IOUT(Q)}$ can be attributed to the resolution of the linear IC quiescent voltage trim and thermal drift.

7.6 Offset voltage V_{OE}

Used to measure the influence of external non-magnetic factors. Under zero-current conditions, in ratiometric output mode, it is the difference between the actual output voltage and the theoretical output voltage.

7.7 Offset temperature drift $V_{IOUT(Q)TC}$

Due to internal circuit tolerance and heat dissipation, static output voltage due to internal circuit tolerance and heat dissipation $V_{OUT(Q)}$ differential static output voltage V_{OE} . May shift with operating temperature $V_{OUT(Q)TC}$.

$$V_{IOUT(Q)TC} = V_{OUT(Q)(T_A)} - V_{OUT(25^\circ\text{C})}$$

7.8 Noise V_N

Noise is the macroscopic sum of thermal noise and shot noise inside the current sensor.

Dividing the noise (mV) by the sensitivity (mV/A) gives the smallest current that the device can resolve.

7.9 Symmetry E_{SYM}

Definition: The relationship between the actual output voltage $V_{IOUT(Q)}$ and the forward half-range $V_{IOUT-POSHALF}$ and reverse half-range $V_{IOUT-NEGHALF}$ outputs.

The formula is defined as follows:

$$E_{SYM} = (1 - (V_{IOUT-POSHALF} - V_{IOUT(Q)}) / (V_{IOUT(Q)} - V_{IOUT-NEGHALF})) \times 100\%$$

7.10 Nonlinearity E_{LIN}

The design output of the device varies linearly with the measured current.

Ideally, under the same supply voltage and ambient temperature conditions, the output sensitivity of the device is the same for two different current sizes I_1 (half scale current) and I_2 (full scale current). In practical application, there is a difference in sensitivity for the measurement of two different current sizes I_1 and I_2 , and nonlinear sensitivity error E_{LIN} describes the difference digitally.

In the chip, positive current nonlinearity E_{LINPOS} and negative current nonlinearity E_{LINNEG} are defined as follows:

I_{POSx} , I_{NEGx} is positive current and negative current

$$I_{POS2} = 2 \times I_{POS1}$$

$$I_{NEG2} = 2 \times I_{NEG1}$$

$$\text{Sens}_{IX} = (V_{IOUT(Ix)} - V_{IOUT(Q)}) / I_x$$

$$E_{LINPOS} = (1 - (\text{Sens}_{IPOS2} / \text{Sens}_{IPOS1})) \times 100\%$$

$$E_{LINNEG} = (1 - (\text{Sens}_{INEG2} / \text{Sens}_{INEG1})) \times 100\%$$

Due to the hysteresis effect of the internal magnetic core, magnetic saturation exists at high currents. Therefore, the nonlinear error

increases when the measured current exceeds 200A. [Specific reference to the sensitivity error E_{SENS}]

7. PARAMETER DESCRIPTION (CONTINUED)

7.11 Proportional output sensitivity error S_{ERR}

The Proportional output sensitivity error S_{ERR} is defined based on the supply voltage V_{CC} :

$$S_{ERR} = (1 - (Sens_{V_{CC}} / Sens_{5V}) / (V_{CC} / 5V)) \times 100\%$$

$$S_{ERR} = (1 - (Sens_{V_{CC}} / Sens_{3.3V}) / (V_{CC} / 3.3V)) \times 100\%$$

Proportional output error of static voltage V_{0zero}

Error between the ratio of V_{out1} and V_{out0} value at $V_{CC} = 5V$ and the theoretical ratio when V_{CC} varies from 4.5V to 5.5V, or at $V_{CC} = 3.3V$ and the theoretical ratio when V_{CC} varies from 3.0V to

$$3.6V. V_{0zero} = (1 - (V_{out1} / V_{out0}) / (V_{CC} / 5V)) \times 100\%$$

$$V_{0zero} = (1 - (V_{out1} / V_{out0}) / (V_{CC} / 3.3V)) \times 100\%$$

7.12 Total output error E_{TOT}

The difference between the current measurement from the sensor IC and the actual current (I_p), relative to the actual current. This is equivalent to the difference between the ideal output voltage and the actual output voltage, divided by the ideal sensitivity, relative to the current flowing through the primary conduction path:

$$E_{TOT} = (V_{IOUT} - V_{IOUTIdeal}) / (Sens_{Ideal} \times I_p) \times 100\%$$

At relatively large current, E_{TOT} is mainly sensitivity error, while at relatively small current, E_{TOT} is mainly zero current sensitivity error voltage V_{OE} . As I_p approaches zero, E_{TOT} approaches infinity due to the bias voltage.

$$V_{IOUTIdeal} = V_{IOUT(Q)} + (Sens_{Ideal} \times I_p)$$

7.13 Dynamic response characteristic

7.13.1 Power-on time T_{PO}

When the supply is ramped to its operating voltage, the device requires a finite amount of time to power its internal components before responding to an input magnetic field. Power-On Time (T_{PO}) is defined as the time interval between the power supply has reached its minimum specified operating voltage (V_{UVLOD}) and the sensor output has settled within $\pm 10\%$ of its steady-state value under an applied magnetic field.

7.13.2 Rise time T_r

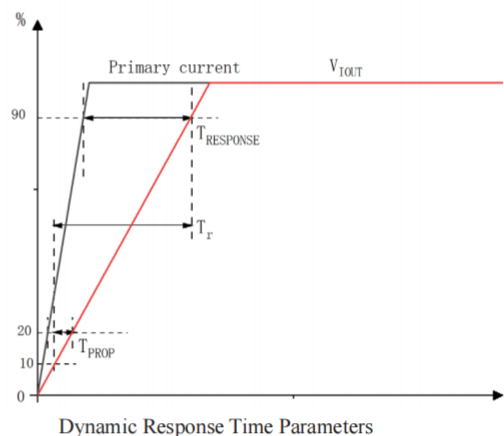
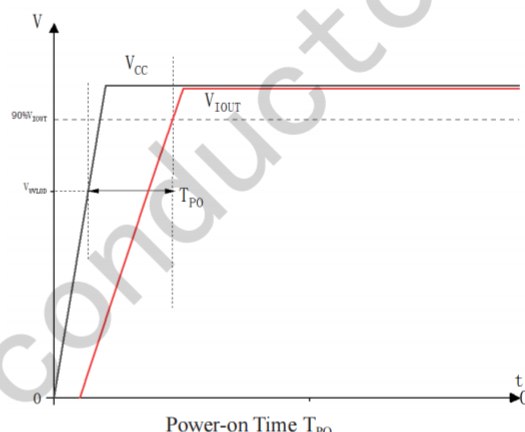
The time interval between the sensor output voltage reaches 10% of its full-scale value and it reaches 90% of its full-scale value.

7.13.3 Propagation delay T_{PROP}

The time interval between the sensed primary current reaches 20% of its final value and the sensor output voltage reaches 20% of its full-scale value.

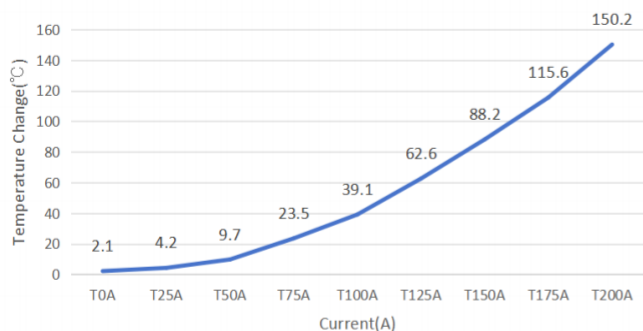
7.13.4 Response Time $T_{RESPONSE}$

The time interval between the sensed primary current reaches 90% of its final value and the sensor output voltage reaches 90% of its full-scale value.

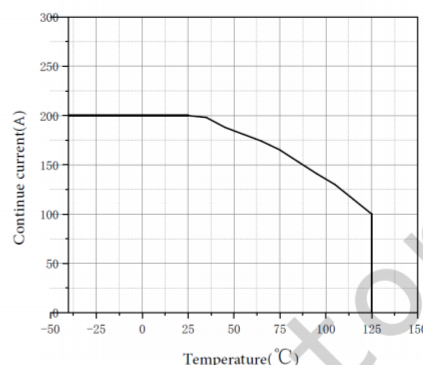


8. THERMAL EVALUATION

The product will naturally heat up during using, and the thermal curve performance of this device was measured in a windless environment at 25±3°C in application laboratory

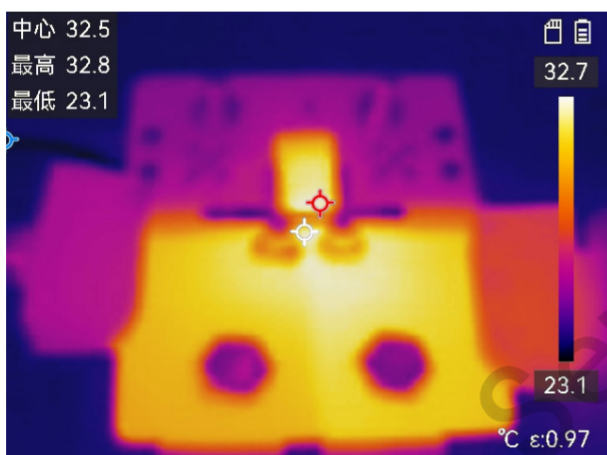


Thermal curve

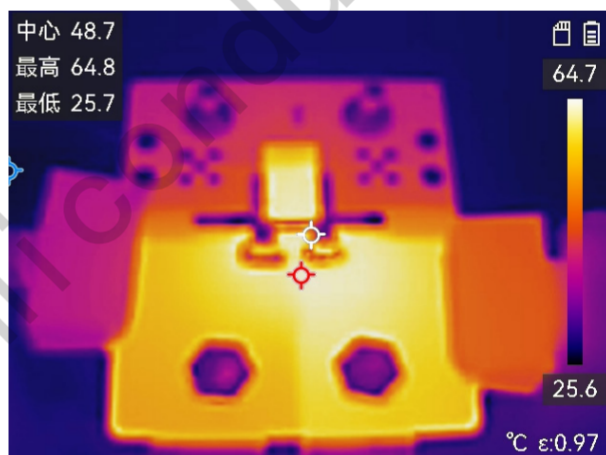


Products above 200A are only used for transient current detection, if you need to work for a long time, please add additional heat dissipation.

Derating curve



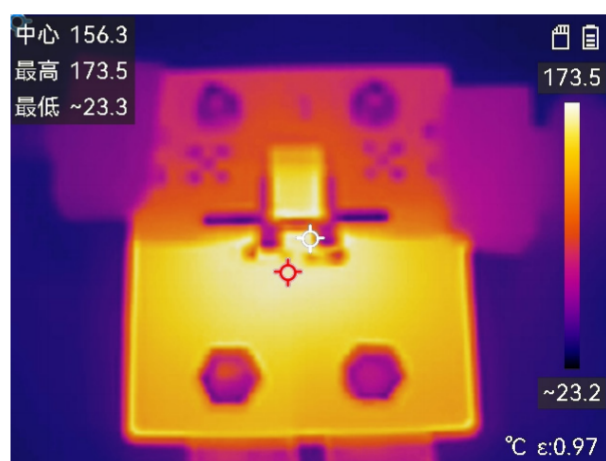
Thermal performance of 50A



Thermal performance of 100A



Thermal performance of 150A

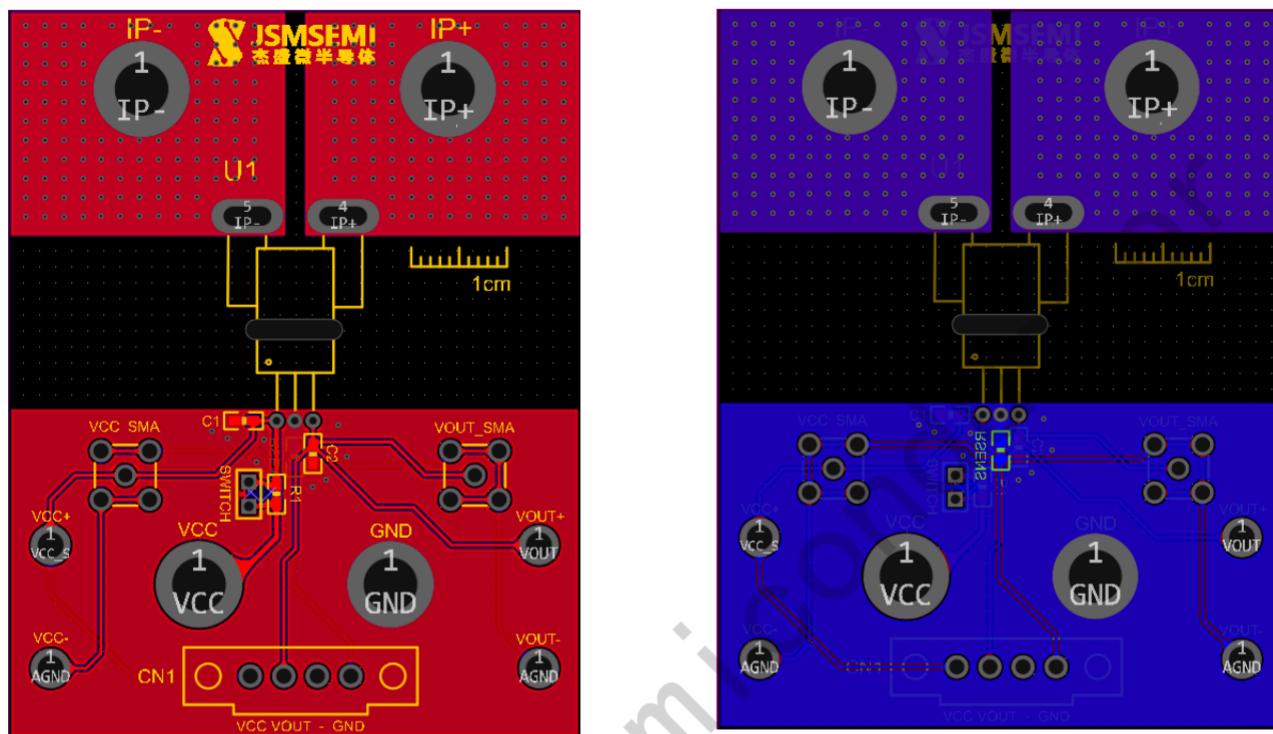


Thermal performance of 200A

9. LAYOUT GUIDELINES

Test information of the demo board

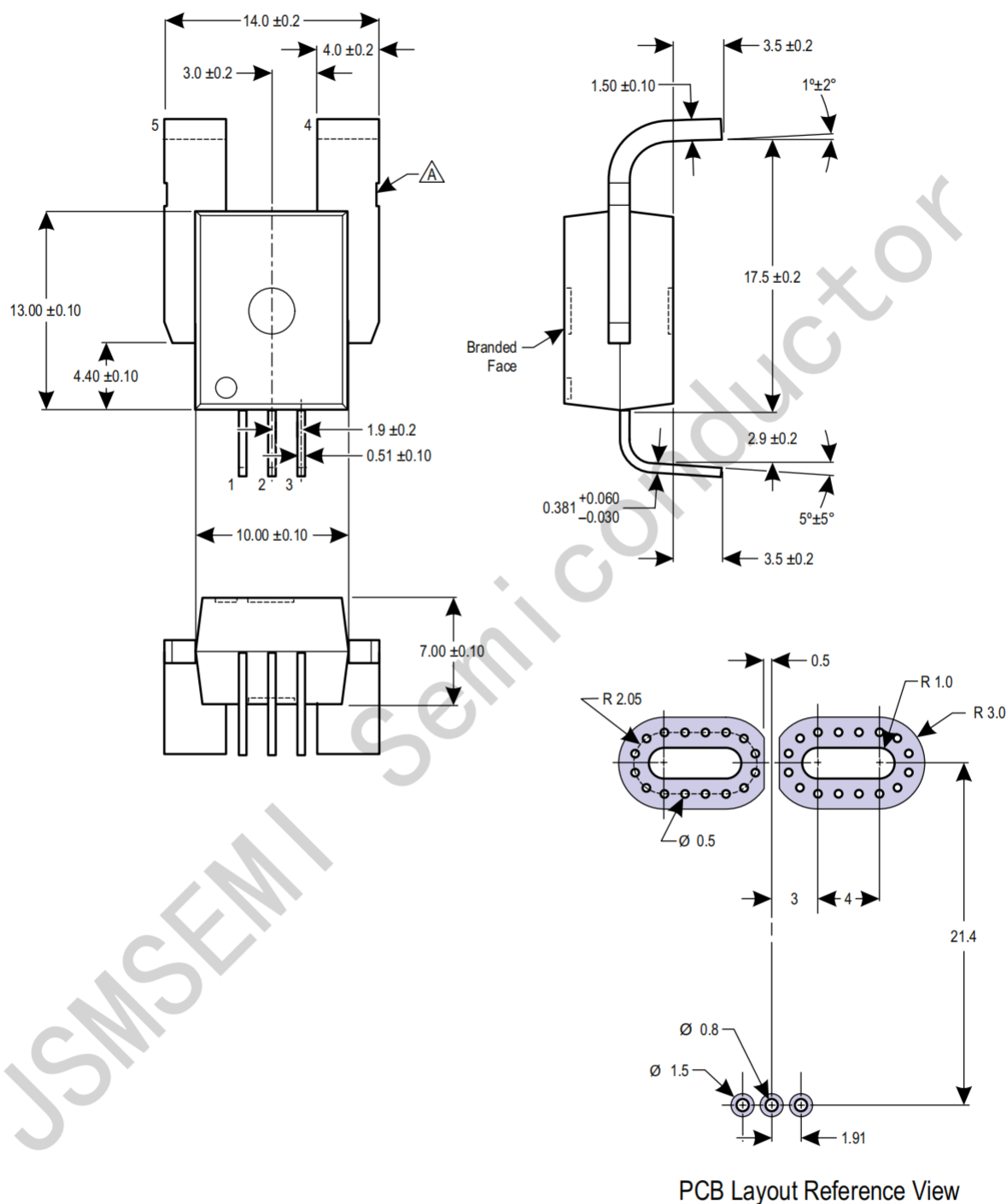
The IP heat dissipation copper thickness of the demo board is 4oz, the heat dissipation area is $2 \times 986 \text{ (mm}^2\text{)}$, the test wiring uses Kelvin sense to avoid the voltage drop caused by GND impedance, and capacitors should set to the chip pins as close as possible. $C_L=0.47\text{nF}$, $C_{VCC}=100\text{nF}$



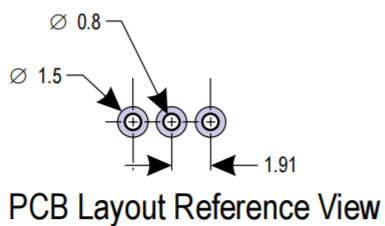
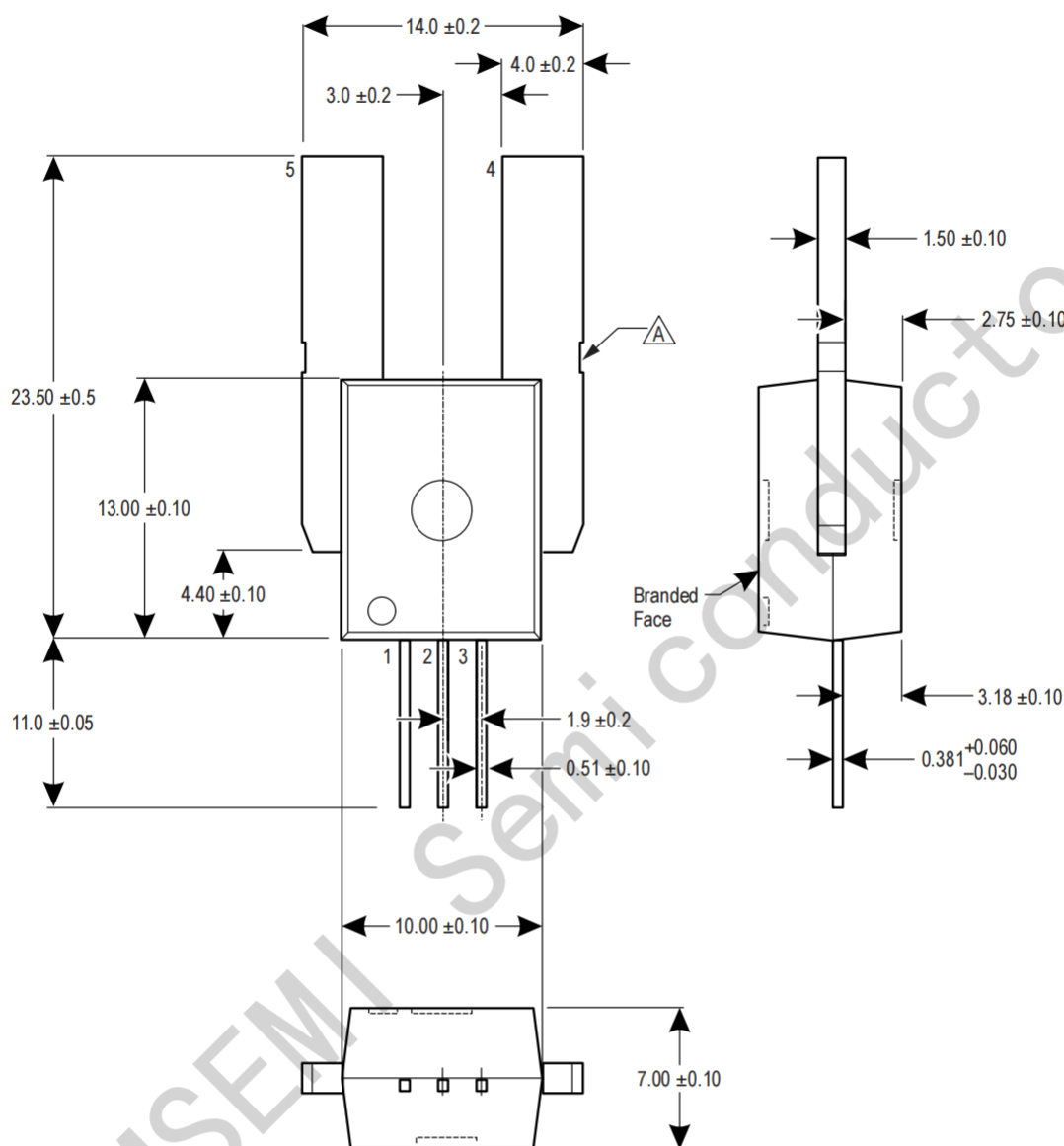
Demo board

10. PACKAGE OUTLINE(CONTINUED)

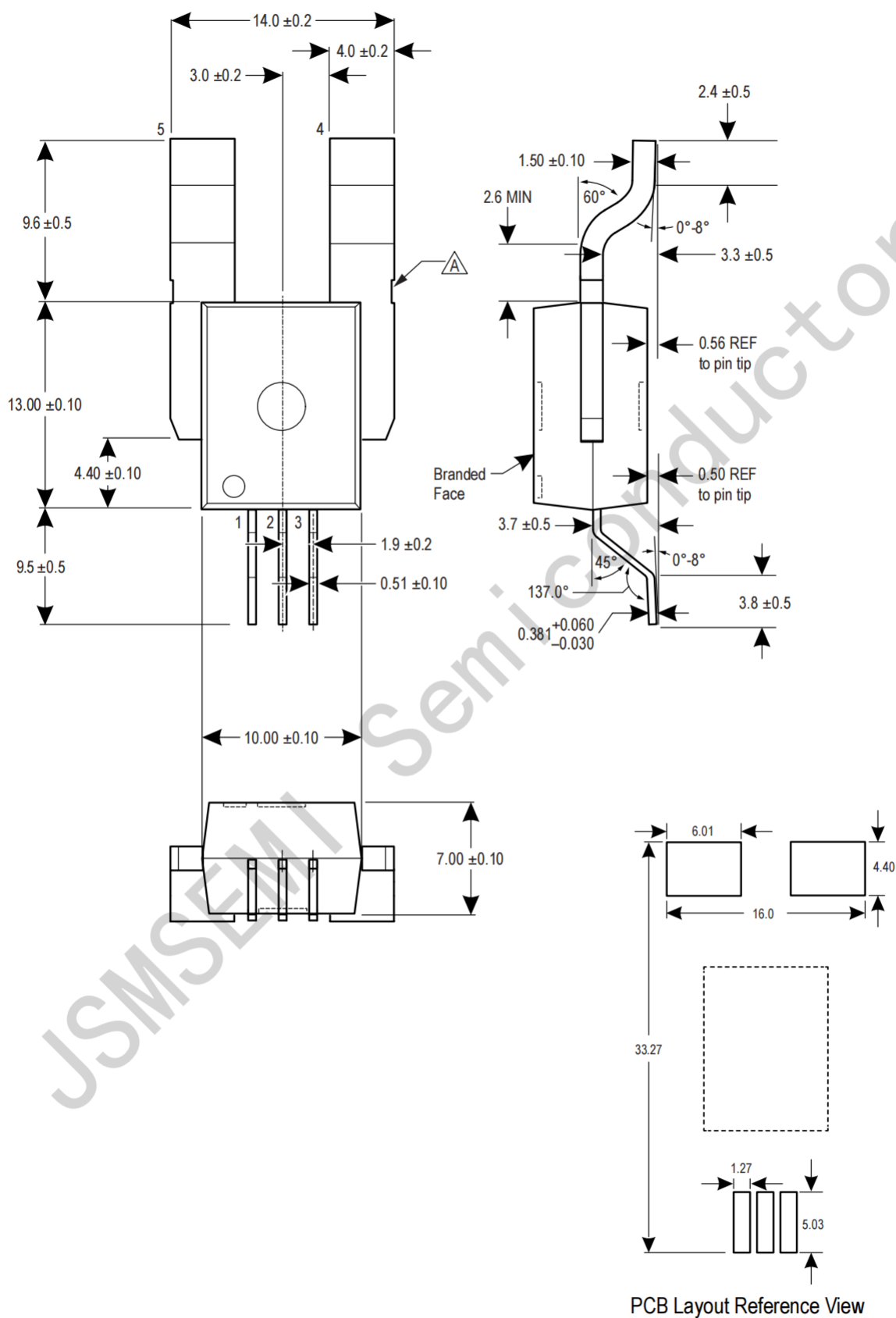
PFF



PSS



SMT



Revision History

Rev.	Change	Date
V1.0	Initial version	3/17/2021

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