Features

- *High Accuracy、Large Current*
  - *0~150A Current sensor*
  - *Low primary conductor resistance: 0.27mΩ*
  - *Typical VOE temperature drift: ±2mV*
  - *Typical sensitivity temperature drift: ±0.2%*
  - *Typical linearity error: ±0.05%*
- *High Bandwidth 、Fast Response*
  - *Typical Bandwidth: 250kHz*
  - *Typical response time: 1.2μs*
- *High Anti-interference、High Isolation*
  - *Differential Hall effectively resists external magnetic field interference*
  - *Isolated voltage: 5000Vrms*
  - *Compatible with 3.3V/5V power supply*
  - *Ratiometric/fixed output*

Description

The PIC1200 series is an open loop hall current sensor that sets high accuracy, high bandwith, fast response, high linearity, low temperature drift and other advantages.PIC1200 provides 0~150A current measurement range. PIC1200 provides a new solution in high performance current sensor area, besides, differential hall sets can immune stray field.

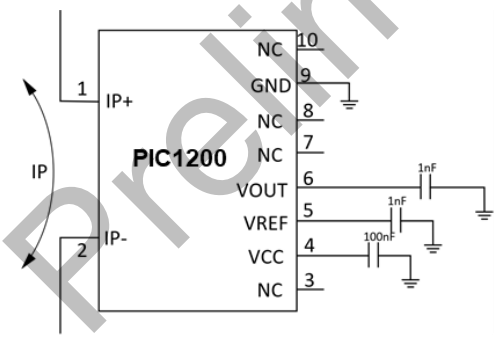
Applications

- *White Goods*
- *Variable-frequency Drive*
- *Power Supply*
- *Motor Control*

Package

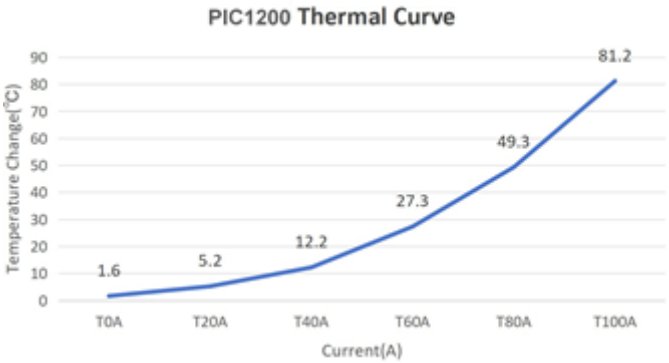
SOIC-10

Application Circuits



Typical Application Circuit Diagram
(Pin sequence : TypeB)

Thermal Curve



Thermal Curve is measured with the room temperature and no wind. The thermal response is highly depends on PCB layout, cooling techniques, copper thickness.

Preliminary Datasheet

Selection Guide

Part Number	Output Mode	IPR(A)	Sensitivity(mV/A)		Operating Temperature	Packing
			*=3	*=5		
PIC1200-*AR050FB-T	Fixed Output Mode	±50	26.4	40	-40℃ ~ 125℃	Tape and reel, 1000 pieces per reel
PIC1200-*AR080FB-T		±80	16.5	25		
PIC1200-*AR100FB-T		±100	13.2	20		
PIC1200-*AR100FU-T		100	26.4	40		
PIC1200-*AR150FB-T		±150	8.8	13.33		
PIC1200-*AR050RB-T	Ratiometric Output Mode	±50	26.4	40		
PIC1200-*AR080RB-T		±80	16.5	25		
PIC1200-*AR100RB-T		±100	13.2	20		
PIC1200-*AR100RU-T		100	26.4	40		
PIC1200-*AR150RB-T		±150	8.8	13.33		

Note: Continuous testing at 25°C supports 100A, if the test range increases or the ambient temperature rises, please refer to the derating curve in application manuals to take heat dissipation measures. 50A and above have unidirectional output mode, new range will be added without notice.

Part Number Specification

PIC1200 - 5 A R 100 R B - T

- Whether it contains lead
  - T：Lead-free process
- Output polarity
  - B：Bipolar
  - U：Unipolar
- Output mode
  - F：Fixed
  - R：Ratiometric
- Current sensing range
- Packing
  - R : Tape and reel
- Pin sequence

Pin sequence	V_{CC}	V_{OUT}	V_{REF}	GND
A	Pin7	Pin6	Pin5	Pin3、10
B	Pin4	Pin6	Pin5	Pin9
C	Pin4	Pin6	Pin7	Pin9

- Supply voltage
  - 3：3.3V
  - 5：5V
- Part Number

Preliminary Datasheet

Absolute Maximum Rating

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	℃	-55	---	150
Operating Ambient Temperature	T_A	℃	-40	---	125
Maximum Junction Temperature	T_{Jmax}	℃	---	---	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 shortenthe device lifetime

ESD Characteristics

Characteristic	Symbol	Unit	Test Conditions	Value
Human Body Model	V_{HBM}	kV	ESD between any two pins	6
Charged Device Model	V_{CDM}	kV		2

Isolation Characteristics

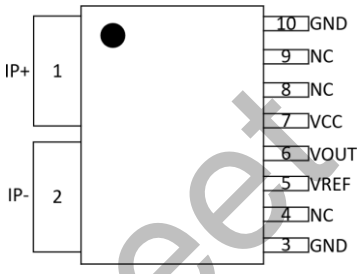
Characteristic	Symbol	Unit	Test Conditions	Value
Dielectric Surge Voltage	V_{SURGE}	V	Test method refers to IEC61000-4-5, 1.2μs/50μs waveform.	10000
Dielectric Strength Test Voltage	V_{ISO}	V_{RMS}	60s, 50Hz isolation withstand voltage parameters, according to UL62368-1, test 6kV/1s before delivery to 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).	1550
		V_{RMS}		1097
Creepage	D_{CR}	mm	Shortest terminal-to-terminal distance across the package surface.	8.2
Comparative Tracking Index	C_{TI}	V	Material Group II	>600

Preliminary Datasheet

Terminal list

TypeA :

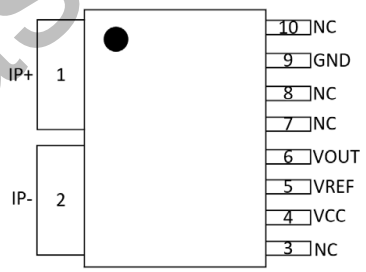
Number	Name	Description
1	IP+	Current flows into the chip, positive direction
2	IP-	Current flows out of the chip, negative direction
3,10	GND	ground terminal
5	VREF	Zero current reference voltage
6	VOUT	Analog output signal
7	VCC	Device power supply terminal
4,8,9	NC	No Connect



Terminal Diagram (TypeA)

TypeB :

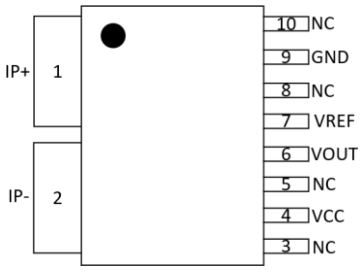
Number	Name	Description
1	IP+	Current flows into the chip, positive direction
2	IP-	Current flows out of the chip, negative direction
9	GND	ground terminal
5	VREF	Zero current reference voltage
6	VOUT	Analog output signal
4	VCC	Device power supply terminal
3,7,8,10	NC	No Connect



Terminal Diagram (TypeB)

TypeC :

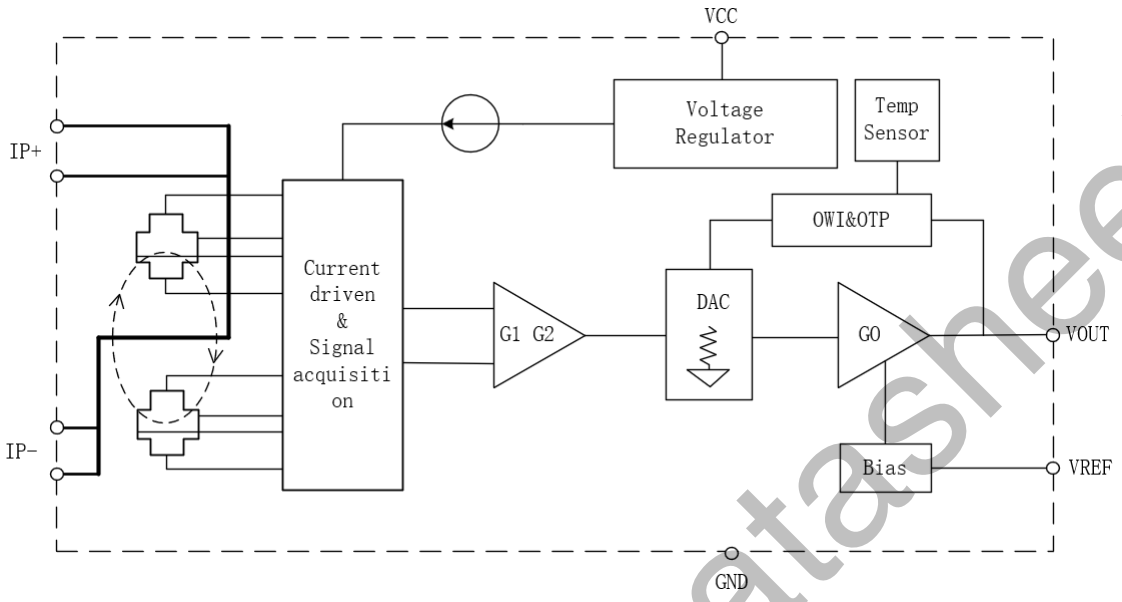
Number	Name	Description
1	IP+	Current flows into the chip, positive direction
2	IP-	Current flows out of the chip, negative direction
9	GND	ground terminal
7	VREF	Zero current reference voltage
6	VOUT	Analog output signal
4	VCC	Device power supply terminal
3,7,8,10	NC	No Connect



Terminal Diagram (TypeC)

Preliminary Datasheet

Functional Block



Functional Block Diagram

Preliminary Datasheet

Electrical Characteristics

Unless otherwise specified, refers to general test conditions: T_A=25℃ · V_{CC}=5V/3.3V · C_{REF}=1nF · C_L=1nF · C_{Vcc}=100nF

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Supply Voltage	V_{CC}	V	*=3	3	3.3	3.6
			*=5	4.5	5	5.5
Supply Current[Note1]	I_{CC}	mA	*=3	---	7.5	10
			*=5	---	10	15
Primary Conductor Resistance[Note1]	R_P	mΩ		---	0.27	---
Power-On Time[Note2]	T_{PO}	ms	Chip power-on (V_{CC}>3.0V) , V_{OUT} and V_{REF} stable time	---	1	---
Output Capacitive Load[Note2]	C_L	nF		---	---	10
Output Resistive Load[Note2]	R_L	kΩ		4.7	---	---
Reference Resistive Load[Note2]	R_{LREF}	Ω		10	---	---
Output Voltage Range[Note2]	V_S	V	R_L=10kΩ to V_{CC} or V_{GND}	0.1	---	V_{CC}-0.1
Common Mode Field Rejection Ratio[Note2]	CMFR	dB		---	40	---
Rise time	T_R	μs	100A range, small signal measurement	---	1.0	---
Response Time	$T_{RESPONSE}$	μs	100A range, small signal measurement	---	1.2	---
Internal Bandwidth	B_W	kHz	100A range, small signal measurement	---	250	---
Output Noise	V_N	mVrms	100A range, small signal measurement	---	4	---
Nonlinearity[Note1]	E_{LIN}	%		---	±0.05	±0.2
Reference Voltage[Note1]	V_{REF}	V	Fixed output, Bipolar, V_{CC}=5V	2.49	2.5	2.51
			Fixed output, Bipolar, V_{CC}=3.3V	1.64	1.65	1.66
			Fixed output, Unipolar, V_{CC}=5V	0.49	0.5	0.51
			Ratiometric output, Bipolar	---	V_{CC}×0.5	---
Ratiometric Output Sensitivity Error[Note1]	S_{ERR}	%	V_{CC}=3.15~3.45V or V_{CC}=4.75~5.25V	---	0.6	---
Sensitivity Temperature Drift[Note1]	dS_{ERR}	%	I_P=I_{PRmax} , T_A=-40℃ ~ 125℃	-1	±0.2	1
Offset Temperature Drift[Note1]	$V_{IOUT(Q)TC}$	mV	I_P=0A, T_A=-40℃ ~ 125℃	-5	±2	5

Note1: These parameters are obtained from laboratory testing with 3σ data.
Note2: These parameters are guaranted by design.

Preliminary Datasheet

PIC1200-*AR050FB-T/RB-T Performance Characteristic

Unless otherwise specified, refers to general test conditions: T_A=25℃ · V_{CC}=5V/3.3V · C_{REF}=1nF · C_L=1nF · C_{Vcc}=100nF

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Nominal Performance						
Current Sensing Range	I_{PR}	A		-50	---	50
Sensitivity(V_{CC}=3.3V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	26.4	---
Sensitivity(V_{CC}=5V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	40	---
Zero Current Output Voltage	$V_{IOUT(Q)}$	V	Bipolar, I_{PR}=0A, V_{CC}=3.3V, Fixed output	1.64	1.65	1.66
			Bipolar, I_{PR}=0A, V_{CC}=5V, Fixed output	2.49	2.5	2.51
			Bipolar, I_{PR}=0A, Ratiometric output	---	V_{CC}*0.5	---
Accuracy Performance						
Total Output Error	E_{TOT}	%	I_P=I_{PRmax} · T_A=-40℃ ~ 125℃	-1.5	±0.5	1.5
Total Output Error Components: E_{TOT} = (V_{IOUT} -$V_{IOUTIdeal}$) /（$Sens_{Ideal}$ × I_P）× 100%						
Sensitivity Error	E_{SENS}	%	I_P=I_{PRmax} · T_A=25℃ ~ 125℃	-1.1	±0.3	1.1
			I_P=I_{PRmax} · T_A=-40℃ ~ 25℃	-0.8	±0.3	0.8
Offset Error[Note2]	V_{OE}	mV	I_P=0A · T_A=25℃ ~ 125℃	-10	±2	10
			I_P=0A · T_A=25℃	-5	±2	5
			I_P=0A · T_A=-40℃ ~ 125℃	-10	±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 : The data is obtained from laboratory testing with 3 σ data

Note2 : Offset error refers to ratiometric output mode of unipolar output or fixed output mode of differential output.

Preliminary Datasheet

PIC1200-*AR080FB-T/RB-T Performance Characteristic

Unless otherwise specified, refers to general test conditions: T_A=25℃ · V_{CC}=5V/3.3V · C_{REF}=1nF · C_L=1nF · C_{Vcc}=100nF

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Nominal Performance						
Current Sensing Range	I_{PR}	A		-80	---	80
Sensitivity(V_{CC}=3.3V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	16.5	---
Sensitivity(V_{CC}=5V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	25	---
Zero Current Output Voltage	$V_{IOUT(Q)}$	V	Bipolar, I_{PR}=0A, V_{CC}=3.3V, Fixed output	1.64	1.65	1.66
			Bipolar, I_{PR}=0A, V_{CC}=5V, Fixed output	2.49	2.5	2.51
			Bipolar, I_{PR}=0A, Ratiometric output	---	V_{CC}*0.5	---
Accuracy Performance						
Total Output Error	E_{TOT}	%	I_P=I_{PRmax} · T_A=-40℃ ~ 125℃	-1.5	±0.5	1.5
Total Output Error Components: E_{TOT} = (V_{IOUT} -$V_{IOUTIdeal}$) /（$Sens_{Ideal}$ × I_P）× 100%						
Sensitivity Error	E_{SENS}	%	I_P=I_{PRmax} · T_A=25℃ ~ 125℃	-1.1	±0.3	1.1
			I_P=I_{PRmax} · T_A=-40℃ ~ 25℃	-0.8	±0.3	0.8
Offset Error[Note2]	V_{OE}	mV	I_P=0A · T_A=25℃ ~ 125℃	-10	±2	10
			I_P=0A · T_A=25℃	-5	±2	5
			I_P=0A · T_A=-40℃ ~ 125℃	-10	±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 : The data is obtained from laboratory testing with 3 σ data

Note2 : Offset error refers to ratiometric output mode of unipolar output or fixed output mode of differential output.

Preliminary Datasheet

PIC1200-*AR100FB-T/RB-T Performance Characteristic

Unless otherwise specified, refers to general test conditions: T_A=25℃ · V_{CC}=5V/3.3V · C_{REF}=1nF · C_L=1nF · C_{Vcc}=100nF

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Nominal Performance						
Current Sensing Range	I_{PR}	A		-100	---	100
Sensitivity(V_{CC}=3.3V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	13.2	---
Sensitivity(V_{CC}=5V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	20	---
Zero Current Output Voltage	$V_{IOUT(Q)}$	V	Bipolar, I_{PR}=0A, V_{CC}=3.3V, Fixed output	1.64	1.65	1.66
			Bipolar, I_{PR}=0A, V_{CC}=5V, Fixed output	2.49	2.5	2.51
			Bipolar, I_{PR}=0A, Ratiometric output	---	V_{CC}*0.5	---
Accuracy Performance						
Total Output Error	E_{TOT}	%	I_P=I_{PRmax} · T_A=-40℃ ~ 125℃	-1.6	±0.6	1.6
Total Output Error Components: E_{TOT} = (V_{IOUT} -$V_{IOUTIdeal}$) /（$Sens_{Ideal}$ × I_P）× 100%						
Sensitivity Error	E_{SENS}	%	I_P=I_{PRmax} · T_A=25℃ ~ 125℃	-1.2	±0.3	1.2
			I_P=I_{PRmax} · T_A=-40℃ ~ 25℃	-0.8	±0.3	0.8
Offset Error[Note2]	V_{OE}	mV	I_P=0A · T_A=25℃ ~ 125℃	-8	±2	8
			I_P=0A · T_A=25℃	-5	±2	5
			I_P=0A · T_A=-40℃ ~ 125℃	-8	±2	8
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 : The data is obtained from laboratory testing with 3 σ data

Note2 : Offset error refers to ratiometric output mode of unipolar output or fixed output mode of differential output.

Preliminary Datasheet

PIC1200-*AR100FU-T/RU-T Performance Characteristic

Unless otherwise specified, refers to general test conditions: T_A=25℃ · V_{CC}=5V/3.3V · C_{REF}=1nF · C_L=1nF · C_{Vcc}=100nF

Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Nominal Performance						
Current Sensing Range	I_{PR}	A		-100	---	100
Sensitivity(V_{CC}=3.3V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	26.4	---
Sensitivity(V_{CC}=5V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	40	---
Zero Current Output Voltage	$V_{IOUT(Q)}$	V	Unipolar, I_{PR}=0A, V_{CC}=5V, Fixed output	0.49	0.5	0.51
			Unipolar, I_{PR}=0A, Ratiometric output	---	V_{CC}*0.1	---
Accuracy Performance						
Total Output Error	E_{TOT}	%	$I_P=I_{PRmax}$ · T_A=-40℃ ~ 125℃	-1.6	±0.6	1.6
Total Output Error Components: $E_{TOT} = (V_{IOUT} - V_{IOUTideal}) / (Sens_{Ideal} \times I_P) \times 100\%$						
Sensitivity Error	E_{SENS}	%	$I_P=I_{PRmax}$ · T_A=25℃ ~ 125℃	-1.3	±0.3	1.3
			$I_P=I_{PRmax}$ · T_A=-40℃ ~ 25℃	-0.8	±0.3	0.8
Offset Error[Note2]	V_{OE}	mV	I_P=0A · T_A=25℃ ~ 125℃	-8	±2	8
			I_P=0A · T_A=25℃	-5	±2	5
			I_P=0A · T_A=-40℃ ~ 125℃	-8	±2	8
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 : The data is obtained from laboratory testing with 3 σ data

Note2 : Offset error refers to ratiometric output mode of unipolar output or fixed output mode of differential output.

Preliminary Datasheet

PIC1200-*AR150FB-T/RB-T Performance Characteristic

Unless otherwise specified, refers to general test conditions: T_A=25℃ · V_{CC}=5V/3.3V · C_{REF}=1nF · C_L=1nF · C_{Vcc}=100nF

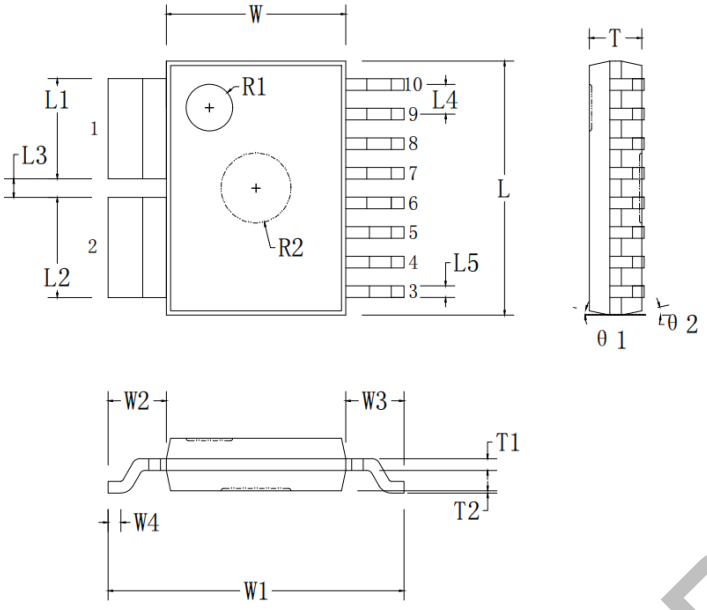
Characteristic	Symbol	Unit	Test Conditions	Min.	Typ.	Max.
Nominal Performance						
Current Sensing Range	I_{PR}	A		-150	---	150
Sensitivity(V_{CC}=3.3V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	8.8	---
Sensitivity(V_{CC}=5V)	Sens	mV/A	$I_{PRmin} < I_{PR} < I_{Prmax}$	---	13.33	---
Zero Current Output Voltage	$V_{IOUT(Q)}$	V	Bipolar, I_{PR}=0A, V_{CC}=3.3V, Fixed output	1.64	1.65	1.66
			Bipolar, I_{PR}=0A, V_{CC}=5V, Fixed output	2.49	2.5	2.51
			Bipolar, I_{PR}=0A, Ratiometric output	---	V_{CC}*0.5	---
Accuracy Performance						
Total Output Error	E_{TOT}	%	$I_P=I_{PRmax}$ · T_A=-40℃ ~ 125℃	-1.6	±0.6	1.6
Total Output Error Components: $E_{TOT} = (V_{IOUT} - V_{IOUTIdeal}) / (Sens_{Ideal} \times I_P) \times 100\%$						
Sensitivity Error	E_{SENS}	%	$I_P=I_{PRmax}$ · T_A=25℃ ~ 125℃	-1.2	±0.3	1.2
			$I_P=I_{PRmax}$ · T_A=-40℃ ~ 25℃	-0.8	±0.3	0.8
Offset Error[Note2]	V_{OE}	mV	I_P=0A · T_A=25℃ ~ 125℃	-8	±2	8
			I_P=0A · T_A=25℃	-5	±2	5
			I_P=0A · T_A=-40℃ ~ 125℃	-8	±2	8
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 : The data is obtained from laboratory testing with 3 σ data

Note2 : Offset error refers to ratiometric output mode of unipolar output or fixed output mode of differential output.

Preliminary Datasheet

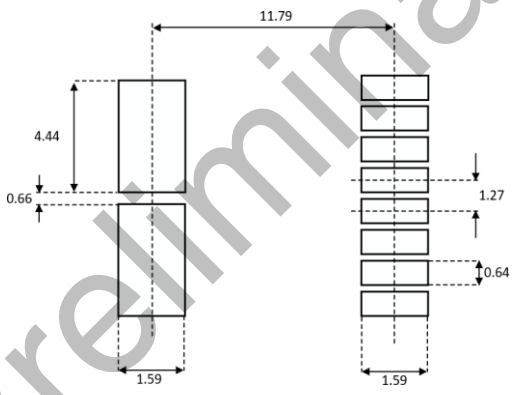
PACKAGE INFORMATION



SOIC-10 Package

NUM	SIZE (mm)			NOTE
	MIN	NOM	MAX	
*W	7.50	7.70	7.90	
*W1	12.50	12.70	12.90	
*W2/W3	2.50	2.60	2.70	
W4	0.40	/	/	
*T	2.15	2.25	2.35	
T1	0.45	0.50	0.55	
T2	0.00	0.10	0.20	
*L	10.70	10.90	11.10	
L1/L2	4.20	4.30	4.40	
L3	0.70	0.80	0.90	
*L4	1.17	1.27	1.37	
*L5	0.45	0.50	0.55	
R1	0.90	1.00	1.10	
R2	1.40	1.50	1.60	
θ1/θ2	9°	12°	15°	

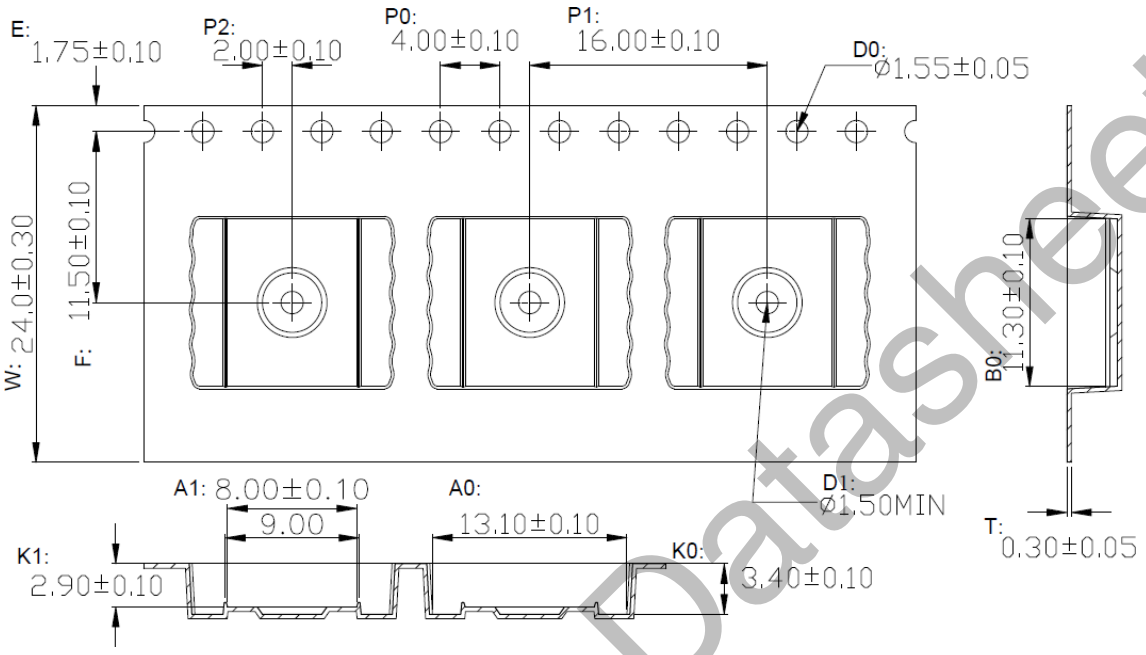
Recommend pad size :

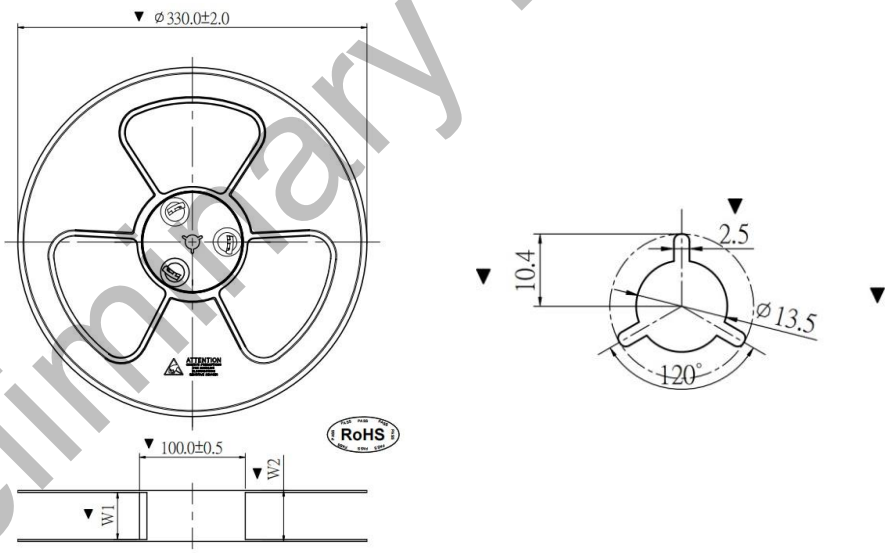


Unit : mm
General linear tolerance: ±0.2mm

Preliminary Datasheet

PACKING INFORMATION





Unit : mm
General linear tolerance: ±0.2mm

Preliminary Datasheet