

### CH701

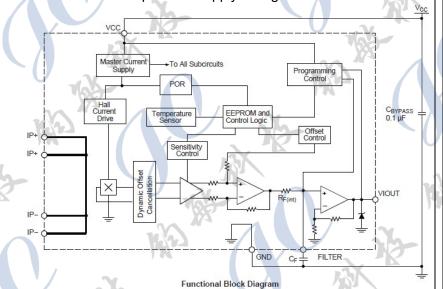
### **Automotive Product Group**

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Preliminary datasheet REV 0.6

### FEATURES and FUNCTIONAL DIAGRAM

- 0.8 m $\Omega$  primary conductor resistance for low power loss and high inrush current withstand capability
- Integrated shield virtually eliminates capacitive coupling from current conductor to die, greatly suppressing output noise due to high dv/dt transients
- Industry-leading noise performance with greatly improved bandwidth through proprietary amplifier and filter design techniques
- High-bandwidth 120 kHz analog output for faster response times in control applications
- Filter pin allows user to filter the output for improved resolution at lower bandwidth
- Integrated digital temperature compensation circuitry allows for near closed loop accuracy over temperature in an open loop sensor
- Small-footprint, low-profile SOIC8 package suitable for spaceconstrained applications
- Filter pin simplifies bandwidth limiting for better resolution at lower frequencies
- Single supply operation
- Output voltage proportional to AC or DC current
- · Factory-trimmed sensitivity and quiescent output voltage for
- improved accuracy
- Chopper stabilization results in extremely stable quiescent output voltage
- Nearly zero magnetic hysteresis
- Ratio-metric output from supply voltage



### **PACKAGE**



SOP8(LC)



Approximate Scale 1:1

### **APPLICATIONS**

motor control; load detection and management; switch-mode power supplies; over current fault protection;



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### DESCRIPTION

The CH701 current sensor IC is an economical and precise solution for AC or DC current sensing in industrial, automotive, commercial, and communications systems. The small package is ideal for space-constrained applications while also saving costs due to reduced board area. Typical applications include motor control, load detection and management, switched-mode power supplies, and overcurrent fault protection.

The device consists of a precise, low-offset, linear Hall sensor circuit with a copper conduction path located near the surface of the die. Applied current flowing through this copper conduction path generates a magnetic field which is sensed by the integrated Hall IC and converted into a proportional voltage. A precise, proportional voltage is provided by the low-offset, chopper-stabilized BCD Hall IC, which is programmed for accuracy after packaging. The output of the device has a positive slope when an increasing current flows through the primary copper conduction path (from pins 1 and 2, to pins 3 and 4), which is the path used for current sensing. The internal resistance of this conductive path is 1.2 m $\Omega$  typical, providing low power loss.

The terminals of the conductive path are electrically isolated from the sensor leads (pins 5 through 8). This allows the CH701 current sensor IC to be used in high-side current sense applications without the use of high-side differential amplifiers or other costly isolation techniques.

The CH701 is provided in a small, low-profile surface-mount SOIC8 package. The leadframe is plated with 100% matte tin, which is compatible with standard lead (Pb) free printed circuit board assembly processes. Internally, the device is Pb-free, except for flip-chip high-temperature Pb-based solder balls, currently exempt from RoHS. The device is fully calibrated prior to shipment from the factory.



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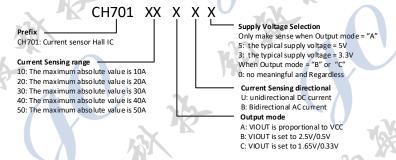
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# 1 Product Family Members

Part Number         I <sub>PR</sub> (A)         Sens(Typ) at V <sub>CC</sub> = 5 V /3.3V (mV/A)         T <sub>A</sub> (°C)         Packing           CH70110AU         10         400/264	
CH70110AB         ±10         200/132           CH70110BU         10         400           CH70110BB         ±10         200           CH70110CU         10         264           CH70110CB         ±10         132           CH70120AU         20         200/132	Part Number
CH70110BU     10     400       CH70110BB     ±10     200       CH70110CU     10     264       CH70110CB     ±10     132       CH70120AU     20     200/132	CH70110AU
CH70110BB     ±10     200       CH70110CU     10     264       CH70110CB     ±10     132       CH70120AU     20     200/132	CH70110AB
CH70110CU         10         264           CH70110CB         ±10         132           CH70120AU         20         200/132	CH70110BU
CH70110CB         ±10         132           CH70120AU         20         200/132	CH70110BB
CH70120AU 20 200/132	CH70110CU
	CH70110CB
OUT0400AD 100	CH70120AU
CH70120AB ±20 100/66	CH70120AB
CH70120BU 20 200	CH70120BU
CH70120BB ±20 100	CH70120BB
CH70120CU 20 132	CH70120CU
CH70120CB ±20 66	
CH70130AU 30 133/88	
<b>CH70130AB</b> ±30 66/44	CH70130AB
CH70130BU 30 133 -40 to 150 Tape and Reel, 3000 pieces	CH70130BU
CH/0130BB ±30 66 per reel	CH70130BB
CH70130CU 30 88	
CH70130CB ±30 44	CH70130CB
CH70140AU 40 100/66	CH70140AU
<b>CH70140AB</b> ±40 50/33	CH70140AB
CH70140BU 40 100	CH70140BU
CH70140BB ±40 50	CH70140BB
CH70140CU 40 66	/
CH70140CB ±40 33	
CH70150AU 50 80/52	
<b>CH70150AB</b> ±50 40/26	
CH70150BU 50 80	
CH70150BB ±50 40	
CH70150CU 50 52	
CH70150CB ±50 26	CH70150CB

CH701x is available in a variety of delivery forms. They are distinguished by a specific nomenclature code:



# 2 Pin Definitions and Descriptions

Number	Name	Function				
1,2	IP+	Terminals for current being sensed; fused internally				
3,4	IP-	Terminals for current being sensed; fused internally				
5	GND	Signal ground terminal				
6	FILTER	Terminal for external capacitor that sets bandwidth				
7	VIOUT	Analog output signal				
8	VCC	Device power supply terminal				



Package LC, 8-Pin SOICN Pin-Out Diagram



### CH70

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# 3 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Supply Voltage	Vcc	-	6	V
Reverse Supply Voltage	V <sub>RCC</sub>	-0.1	-	V
Output Voltage	V <sub>IOUT</sub>	-	V <sub>CC</sub> +0.5	V
Reverse Output Voltage	$V_{RIOUT}$	-0.1	- 1	V
Operating Ambient Temperature	TA	-40	150	°C
Storage Temperature	Ts	-65	165	°C
Junction temperature	$T_{J(max)}$		165	°C

Note 1: Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum- rated conditions for extended periods may affect device reliability.

### **Isolation Characteristics**

Characteristic	Symbol	Notes	Rating	/ Unit
Dielectric Strength Test Voltage	Viso	Agency type-tested for 60 seconds per UL standard 60950-1 (edition 2); production-tested at V_ISO for 1 second, in accordance with UL 60950-1 (edition 2).	2400	VRMS
Working Voltage for Basic Isolation	VwvBi	Maximum approved working voltage for basic (single) isolation according to UL 60950-1 (edition 2)	420 297	V <sub>pk</sub> or VDC

### **Thermal Characteristics**

Characteristic	Symbol	Test Conditions*	Value	Units
Package Thermal Resistance (Junction to Ambient)	Reja	Wy M	23	°C/W
Package Thermal Resistance (Junction to Lead)	Rejl	为一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个	5	°C/W

# 4 ESD Protections

1/1/2	Parameter	Value	Unit
All pins 1)	3X 'K	±4000	V
All pins 2)	32	±200	V
All pins 3)	Max O	±500	V

- 1) HBM (human body mode, 100pF, 1.5 kΩ) according to MIL-STD-883H Method 3015.8
- 2) MM (Machine Mode C=200pF, R=0Ω) according to JEDEC EIA/JESD22-A115
- 3) CDM (charged device mode) according to JEDEC EIA/JESD22-C101F



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## 5 Electrical Characteristics<sup>1</sup>:

Valid through the full range of TA, VCC = 5 V, CF = 0, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Supply Current	Icc	V <sub>CC</sub> = 5 V, output open	_	10	14	mA
Output Capacitance Load	CL	VIOUT to GND	_	_	10	nF
Output Resistive Load	RL	VIOUT to GND	4.7	_	74\1	kΩ
Primary Conductor Resistance	R <sub>IP</sub>	T <sub>A</sub> = 25°C	-	1.2	134	mΩ
Internal Filter Resistance <sup>2</sup>	RF(int)	KA)	<b>'</b> /-	1.8	_	kΩ
Hall Coupling Factor	G	T <sub>A</sub> = 25°C	-	-11	-	G/A
Hall Plate Sensitivity Matching	Sens <sub>match</sub>	T <sub>A</sub> = 25°C	-77	±1	_	%
Rise Time	t <sub>r</sub>	$I_P = I_P(max), T_A = 25^{\circ}C, C_L = 1 \text{ nF}$	V - 1	3	-	μs
Propagation Delay	tpd	$I_P = I_P(max), T_A = 25^{\circ}C, C_L = 1 \text{ nF}$	) <u> </u>	2		μs
Response Time	tresponse	$I_P = I_P(max), T_A = 25^{\circ}C, C_L = 1 \text{ nF}$	- /	4	1_/	μs
Bandwidth	BW	Small signal –3 dB; C <sub>L</sub> = 1 nF	-	120	-	kHz
Noise Density	IND	Input-referenced noise density; T <sub>A</sub> = 25°C, C <sub>L</sub> = 1 nF	-	150	- /	μA <sub>(rms)</sub> / √Hz
Noise	ln	Input-referenced noise: $C_F = 4.7$ nF, $C_L = 1$ nF, BW = 18 kHz, $T_A = 25^{\circ}C$	ı	20		mA <sub>(rms)</sub>
Nonlinearity	ELIN	Through full range of I <sub>P</sub>	-1.5	3/3	+1.5	%
Sensitivity Ratiometry Coefficient	SENS_RAT_ COEF	$V_{CC} = 4.5 \text{ to } 5.5 \text{ V}, T_A = 25^{\circ}\text{C}$	34	1.3	-	(-)
Zero-Current Output Ratiometry Coefficient	QVO_RAT_ COEF	V <sub>CC</sub> = 4.5 to 5.5 V, T <sub>A</sub> = 25°C	K	1	-	
	Vон	$R_L = 4.7 \text{ k}\Omega$	_	V <sub>CC</sub> - 0.3	-	V
Saturation Voltage <sup>3</sup>	Vol	R <sub>L</sub> = 4.7 kΩ	(	0.3	-	V
Power-On Time	tpo	Output reaches 90% of steady- state level, T <sub>A</sub> = 25°C, I <sub>P</sub> = I <sub>PR</sub> (max) applied		80	-	μs
Shorted Output-to-Ground Current	ISC(GND)	T <sub>A</sub> = 25°C	A	3.3	1	mA
Shorted Output-to-V <sub>CC</sub> Current	Isc(vcc)	T <sub>A</sub> = 25°C	Ū	45	-	mA

<sup>&</sup>lt;sup>1</sup>Device may be operated at higher primary current levels, I<sub>P</sub> , ambient temperatures, T<sub>A</sub> , and internal leadframe temperatures, provided the Maximum Junction Temperature, T<sub>J</sub>(max), is not exceeded.

 $<sup>^2</sup>R_{\text{F(int)}}$  forms an RC circuit via the FILTER pin.

<sup>&</sup>lt;sup>3</sup>The sensor IC will continue to respond to current beyond the range of I<sub>P</sub> until the high or low saturation voltage; however, the nonlinearity in this region will be worse than through the rest of the measurement range.



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CH70110AU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

V <sub>CC</sub>	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
> .		3		>(	7
> .		3			
I PR			_	5.5	V
	TAX O	0	_	10	Α
0	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	<i></i>	264	- '	mV/A
Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	400	<del>}-</del>	mV/A
	Unidirectional, $I_P = 0$ A, VCC = 3V-3.3V	-/-	V <sub>cc</sub> × 0.1	-	V
IOUT(Q)	Unidirectional, $I_P = 0$ A, VCC = 4.5V-5V	K-	V <sub>cc</sub> × 0.1	<u>a</u>	V
Ŝ	Z X	8			/
F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2.5	±1.5	2.5	%
ТОТ	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4.5	6	%
onents <sup>3</sup> E	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )				5
F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±1	2	%
sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4.5	5.5	%
V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-15	±7	15	mV
OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±13	30	mV
stics	Ker				
sens_drift	237	-3	±1	3	%
E <sub>tot_drift</sub>	+ U XX	-3	±1	3	%
	E <sub>sens</sub> V <sub>OE</sub> stics  sens_drift  E <sub>tot_drift</sub>	Sens	$Sens \begin{tabular}{l l l l l l l l l l l l l l l l l l l $	$Sens = \begin{cases} I_{PR(min)} < I_{P} < I_{PR(max)}, VCC = 3.3V & - & 264 \\ I_{PR(min)} < I_{P} < I_{PR(max)}, VCC = 5V & - & 400 \\ I_{PR(min)} < I_{P} < I_{PR(max)}, VCC = 3V-3.3V & - & 0.1 \\ Unidirectional, I_{P} = 0 \text{ A, VCC} = 3V-3.3V & - & 0.1 \\ Unidirectional, I_{P} = 0 \text{ A, VCC} = 4.5V-5V & - & 0.1 \\ I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}\text{C to } 150^{\circ}\text{C} & -2.5 & \pm 1.5 \\ I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}\text{C to } 25^{\circ}\text{C} & -6 & \pm 4.5 \\ I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}\text{C to } 150^{\circ}\text{C} & -2 & \pm 1 \\ I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}\text{C to } 150^{\circ}\text{C} & -5.5 & \pm 4.5 \\ I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}\text{C to } 25^{\circ}\text{C} & -5.5 & \pm 4.5 \\ I_{P} = 0 \text{ A, } T_{A} = 25^{\circ}\text{C to } 150^{\circ}\text{C} & -15 & \pm 7 \\ I_{P} = 0 \text{ A, } T_{A} = -40^{\circ}\text{C to } 25^{\circ}\text{C} & -30 & \pm 13 \\ \text{Stics} & -3 & \pm 1 \\ E_{tot\_drift} & -3 & \pm 1 \\ E_{tot\_drift} & -3 & \pm 1 \\ \end{cases}$	$Sens \begin{tabular}{l l l l l l l l l l l l l l l l l l l $

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information



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CH70110AB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(0.5)	) 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance	12	13-				
Supply Voltage	V <sub>cc</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TO THE CO	-10	-	10	Α
Camalification	C	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	<i>_</i>	132	- '	mV/A
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	200	3-	mV/A
Zero-Current Output	V	Bidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	78	V <sub>cc</sub> × 0.5	_	V
Voltage	$V_{IOUT(Q)}$	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	<b>X</b> =	V <sub>CC</sub> × 0.5		V
Accuracy Performance	3	N X	X	1	V	/
Total Output Emar?	VE	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±1	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4.5	6	%
Total Output Error Con	nponents³ E	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )				1
O Mile it F	F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±1	1.5	%
Sensitivity Error	Esens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4.5	5.5	%
Z K	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	[42]				
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	- U -X	-3	±1	3	%
Typical values with +/- are 3	eigma value					

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output



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CH70110BU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(3)	1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		13-				<b>y</b>
Supply Voltage	V <sub>CC</sub>		4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TAX O	0	_	10	Α
Sensitivity	Sens		<i>-</i>	400	_ ′	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A	-	0.5	3=	٧
Accuracy Performance		· ·	R			
Tatal Output Fman2	F.	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2.5	±1.5	2.5	%
Total Output Error <sup>2</sup>	Етот	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-6	±4.5	6	%
Total Output Error Cor	mponents³E	: <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	4	1		
Consitivity From	TEX	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±1	2	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4.5	5.5	%
Offerst Veltage	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-15	±7	15	mV
Offset Voltage	V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = -40°C to 25°C	-30	±13	30	mV
Lifetime Drift Characte	eristics					
Sensitivity Error Lifetime Drift	E sens_drift	132	-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	Mary Control	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output



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CH70110BB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(66)	IN				
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit	
Nominal Performance	13/2	10-	×				
Supply Voltage	V <sub>CC</sub>		4.5	_	5.5	V	
Current-Sensing Range	I <sub>PR</sub>		-10	_	10	Α	
Sensitivity	Sens		7	200	-	mV/A	
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A	/- ,	2.5	3=	V	
Accuracy Performance			7				
Tatal Outs 4 Fina 2	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±1	2	%	
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4.5	6	%	
Total Output Error Con	nponents³E	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	Al -	1			
0	FX	$I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±1	1.5	%	
Sensitivity Error	sens	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4.5	5.5	%	
Office A Malkage	V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV	
Offset Voltage	OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C} \text{ to } 25^{\circ}\text{C}$	-30	±8	30	mV	
Lifetime Drift Characteristics							
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%	
Total Output Error Lifetime Drift	E tot_drift	Mary Control	-3	±1	3	%	

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output

error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information



## **Automotive Product Group**

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### Preliminary datasheet REV 0.6

CH70110CU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		100	174			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		73-	×			,
Supply Voltage	V <sub>CC</sub>		3	_	5.5	٧
Current-Sensing Range	I <sub>PR</sub>	10%	0	_	10	Α
Sensitivity	Sens		<i>-</i>	264	-	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A	- ,	0.33	3-	V
Accuracy Performance	, //		A	X		
Tatal Outral Email	F.	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2.5	±1.5	2.5	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4.5	6	%
Total Output Error Cor	mponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	M	1		
Consisting to Fores	T <sub>E</sub> X	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±1	2	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4.5	5.5	%
Officet Voltage	V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-15	±7	15	mV
Offset Voltage	OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±13	30	mV
Lifetime Drift Characte	ristics					
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	Kin C	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output

error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section



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### Preliminary datasheet REV 0.6

CH70110CB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(32)	170			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-				,
Supply Voltage	V <sub>cc</sub>		3	_	5.5	<b>V</b>
Current-Sensing Range	I <sub>PR</sub>	TO TO	-10	_	10	Α
Sensitivity	Sens	PR(min) < P < PR(max)	7	132	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A	_ ,	1.65	<del>}-</del>	V
Accuracy Performance	, //		A			
Tatal Outsut Fam. 2	F.	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±1	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4.5	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )		1		
O W. it . F.	FX	$I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±1	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4.5	5.5	%
Office A Malkage	V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	A STE		1/		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	King (	-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
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### Preliminary datasheet REV 0.6

# CH70120AU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(32)	) 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		13-			-	<b>,</b>
Supply Voltage	V <sub>cc</sub>	13	3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TO TO	0	_	20	Α
O Will the	0	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	132	-	mV/A
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	200	<del>}-</del>	mV/A
Zero-Current Output	V	Unidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	-/-	V <sub>cc</sub> × 0.1	-	٧
Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>cc</sub> × 0.1		٧
Accuracy Performance	• 3		73	1		/
Total Output Eman?	YE	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Cor	nponents³ l	$E_{TOT} = E_{SENS} + 100 \times V_{OE}/(Sens \times I_P)$				1
Compiting the Fores	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4 1	5.5	%
Offset Voltage	V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Oliset Voltage	OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	A mV/A mV/A V V % % % %
Lifetime Drift Characte	ristics	Mary Control		-		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	- U XX	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

## CH70120AB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

		1 10			
Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
	10-			-	
V <sub>CC</sub>	A CONTRACTOR OF THE PROPERTY O	3	_	5.5	V
I <sub>PR</sub>	Take O	-20	_	20	Α
0	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	66	-	mV/A
Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	100	3	mV/A
V	Bidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	-/-	V <sub>cc</sub> × 0.5	ı	٧
IOUT(Q)	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>CC</sub> × 0.5		A mV/A v v v w w w w w w w w w w w w w w w w
. 3		73	1		/
YE	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
ТОТ	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
nponents³ I	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	1			1
F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4 1	5.5	%
V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
ristics	[42]		}-		
E sens_drift		-3	±1	3	%
E <sub>tot_drift</sub>		-3	±1	3	%
	V <sub>CC</sub> I <sub>PR</sub> Sens V <sub>IOUT(Q)</sub> E <sub>TOT</sub> Inponents <sup>3</sup> I E <sub>sens</sub> V <sub>OE</sub> Iristics E <sub>sens_drift</sub>	$V_{CC}$ $I_{PR}$ Sens $\frac{I_{PR(min)} < I_{P} < I_{PR(max)}, VCC = 3.3V}{I_{PR(min)} < I_{P} < I_{PR(max)}, VCC = 5V}$ $W_{IOUT(Q)}$ Bidirectional, $I_{P} = 0$ A, $VCC = 3.3V$ Bidirectional, $I_{P} = 0$ A, $VCC = 5V$ $E_{TOT}$ $I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$ Inponents <sup>3</sup> $E_{TOT} = E_{SENS} + 100 \times V_{OE}/(SenS \times I_{P})$ $E_{Sens}$ $I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$ $V_{OE}$ $I_{P} = 0 \text{ A, } T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = 0 \text{ A, } T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$ ristics $E_{Sens\_drift}$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP , with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70120BU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		102	1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance	14	10-				
Supply Voltage	V <sub>CC</sub>	13	4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TAX O	0	-	20	Α
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	200	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	- ,	0.5	3=	<b>V</b>
Accuracy Performance		×	J.			
Total Output Funar?	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	N -	1		
	Teles	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
Office A Malkage	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	The state of the s				
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	16.50	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70120BB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		102	1 10			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-			-	<b>y</b>
Supply Voltage	V <sub>CC</sub>	137	4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TAX O	-20	_	20	Α
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	100	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	- ,	2.5	?=	٧
Accuracy Performance		× 1	A			
	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Cor	mponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	N/ ~	1		
	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4	5.5	%
Official Vallaging	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	5.5 V 20 A - mV - V 2 % 6 % 1.5 % 5.5 % 10 m\ 30 m\	mV
Lifetime Drift Characte	ristics	The state of the s				
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	16.50	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70120CU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

	(32)	1 14			
Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
	13-				
V <sub>cc</sub>		3	_	5.5	V
I <sub>PR</sub>	TANK O	0	_	20	Α
Sens	PR(min) <   P <   PR(max)	7	132	- '	mV/A
V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A	- ,	0.33	3=	>
	X. (A)	J.			
E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
_тот	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	NI -	1		
Ex	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
sens	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4	5.5	%
V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
ristics	The state of the s				
E sens_drift		-3	±1	3	%
E tot_drift	To the state of th	-3	±1	3	%
	V <sub>CC</sub> I <sub>PR</sub> Sens V <sub>IOUT(Q)</sub> E <sub>TOT</sub> Inponents <sup>3</sup> I E <sub>sens</sub> V <sub>OE</sub> Instices E <sub>sens_drift</sub> E <sub>tot_drift</sub>	$\begin{array}{c c} V_{CC} & & & & & & & & & & & & & & & & & & $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70120CB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otnerwise specified			, •••			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-				
Supply Voltage	V <sub>CC</sub>	A CONTRACTOR OF THE PROPERTY O	3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	Tolk (	-20	_	20	Α
Sensitivity	Sens	$ _{PR(min)} <  _{P} <  _{PR(max)}$	7	66	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A	- ,	1.65	3-	٧
Accuracy Performance		X. X	A			
Total Output From	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
Total Output Error <sup>2</sup>	тот	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )		1		
Compitibility Fores	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
O#5-41/4-14-14	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	V A mV/A V % % %
Lifetime Drift Characte	ristics	J. A.				
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift Typical values with +/- are 3	E tot_drift	1692	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70130AU Performance Characteristics: T<sub>A</sub> Range L, valid at T<sub>A</sub> = -40°C to 150°C, unless otherwise specified

otherwise specified		132	1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ.1	Max.	Unit
Nominal Performance	1372	10-	•			
Supply Voltage	V <sub>cc</sub>	A CONTRACTOR	3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	10%	0	_	30	Α
Compatibility in	Come	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	88	-	mV/A
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	-	133	<del>}-</del>	mV/A
Zero-Current Output Voltage	V	Unidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	-7.5	V <sub>cc</sub> × 0.1	-	>
	V IOUT(Q)	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>cc</sub> × 0.1		A mV/A v v v w w w w w w w w w w w w w w w w
Accuracy Performance	e <i>1</i>		XX	1	1	/
Total Output Error <sup>2</sup>	YE	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error-	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Co	mponents <sup>3</sup>	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	1			3
Compitinity Famou	F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	E sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4 1	5.5	%
Office Males	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±7	30	mV
Lifetime Drift Characte	eristics	Mar.		}-		
Sensitivity Error Lifetime Drift	E sens_drift	13	-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift		-3	±1	3	%
Typical values with +/- are	3 sigma value					

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



## **Automotive Product Group**

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### Preliminary datasheet REV 0.6

CH70130AB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		132	) 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		13-	>			<b>,</b>
Supply Voltage	V <sub>cc</sub>	A A	3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TOX T	-30	_	30	Α
Consideration	Come	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	44	-	mV/A
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	-	66	<del>}-</del>	mV/A
Zero-Current Output Voltage	V	Bidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	-).	V <sub>cc</sub> × 0.5	-	V
	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	(X=	V <sub>cc</sub> × 0.5	<b>A</b>	V
Accuracy Performanc	e <i>1</i>	N. A.	XX	1		/
Total Output Error <sup>2</sup>	YE	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
Total Output Error-	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Co	mponents <sup>3</sup>	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	1			4
Consitivity From	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.8	1.5	%
Sensitivity Error	E sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4 1	5.5	%
Official Voltage	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
Lifetime Drift Characte	eristics	Me		}		
Sensitivity Error Lifetime Drift	E sens_drift	, (X)	-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift		-3	±1	3	%
Typical values with +/- are	3 sigma value	9				

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70130BU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otnerwise specified		TO TO THE TOTAL PROPERTY OF THE TOTAL PROPER	, •••			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-				,
Supply Voltage	V <sub>CC</sub>		4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	Take O	0	_	20	Α
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	133	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	- ,	0.5	?=	V
Accuracy Performance		X	A			
T. 1. 1. 1. 1. 1. 2.	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Cor	mponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	4	1		
0 " " -	E	$I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
Office A Malkage	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	The state of the s		13	27.	
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	16.62	-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70130BB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

	102	) 14			
Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
	13-				
V <sub>CC</sub>		4.5	_	5.5	V
I <sub>PR</sub>	TAX O	-20	_	20	Α
Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	66	- '	mV/A
V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	- ,	2.5	3=	>
	X. (A)	A			
F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
_тот	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	N/	1		
Text	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
ristics			1.3	<b>A</b>	
E sens_drift		-3	±1	3	%
E tot_drift	16.50	-3	±1	3	%
	V <sub>CC</sub> I <sub>PR</sub> Sens V <sub>IOUT(Q)</sub> E <sub>TOT</sub> Inponents <sup>3</sup> I E <sub>sens</sub> V <sub>OE</sub> ristics E <sub>sens_drift</sub>	$V_{CC}$ $I_{PR}$ Sens $I_{PR(min)} < I_{P} < I_{PR(max)}, VCC = 5V$ $V_{IOUT(Q)}$ Bidirectional, $I_{P} = 0$ A, $VCC = 5V$ $E_{TOT}$ $I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$ $I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = I_{PR(max)}, T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$ $V_{OE}$ $I_{P} = 0 \text{ A, } T_{A} = 25^{\circ}C \text{ to } 150^{\circ}C$ $I_{P} = 0 \text{ A, } T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$ $ristics$ $E_{sens\_drift}$ $E_{tot\_drift}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70130CU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(32)	1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ.1	Max.	Unit
Nominal Performance		13-				
Supply Voltage	V <sub>cc</sub>		3	-	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TANK O	0	_	20	Α
Sensitivity	Sens	PR(min) <   P <   PR(max)	7	88	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A	- 、	0.33	3=	>
Accuracy Performance		X. (A)	J.			
Total Output Frrag?	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )		1		
0	Teles	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4	5.5	%
Official Voltages	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics					
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	King (	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70130CB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified			1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		33-	>		-	<b>y</b>
Supply Voltage	V <sub>CC</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>		-20	-	20	Α
Sensitivity	Sens	PR(min) < P < PR(max)	7	44	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A	/- ,	1.65	?=	٧
Accuracy Performance	e /	3	A			
Tatal Outsut Face	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	mponents <sup>3</sup>	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	M	1		
0 "" "	TEX.	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
05.174	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
Lifetime Drift Characte	eristics					_
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift		-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70140AU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(5)2)	7 10			
Characteristic	Symbol	Test Conditions	Min.	Typ.1	Max.	Unit
Nominal Performance		79-				<u> </u>
Supply Voltage	V <sub>cc</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TO TO	0	_	20	Α
Sensitivity	0	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	66	-	mV/A
	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	-	100	<del>}-</del>	mV/A
Zero-Current Output	V	Unidirectional, $I_P = 0$ A, VCC = 3.3V	-)	V <sub>cc</sub> × 0.1	-	V
Voltage	$V_{IOUT(Q)}$	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>cc</sub> × 0.1		V
Accuracy Performance	. 3		XX	1	\ \ \	/
Total Output Error?	TE.	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ I	$E_{TOT} = E_{SENS} + 100 \times V_{OE}/(Sens \times I_P)$	,			3)
O Min it E	F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	Esens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
Z K	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	[6,2]		}		
Sensitivity Error Lifetime Drift	E_sens_drift	13	-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>		-3	±1	3	%
Typical values with +/- are 3	aigman value					

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70140AB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(32)	) 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance	11/2	10-			1	<b>,</b>
Supply Voltage	V <sub>cc</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TO TO	-20	_	20	Α
Sensitivity	Come	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	33	-	mV/A
	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	50	3-	mV/A
Zero-Current Output	V	Bidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	-/-	V <sub>cc</sub> × 0.5	-	V
Voltage	$V_{IOUT(Q)}$	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>cc</sub> × 0.5		٧
Accuracy Performance	3			1		/
Total Output Error <sup>2</sup>	MAX	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
Total Output Error-	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con		E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )				1
0 11 11 5	F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
Sensitivity Error	Esens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
N. K.	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
Lifetime Drift Characte	ristics	March 1		-		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	- U - X	-3	±1	3	%
Typical values with +/- are 3	sigma value					

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70140BU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		102	1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-			-	<b>y</b>
Supply Voltage	V <sub>cc</sub>		4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TAX O	0	_	20	Α
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	100	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	- ,	0.5	3=	<b>V</b>
Accuracy Performance		X. (A)	J.			
Total Output Funa?	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	N -	1		
0	Teles	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4	5.5	%
Official Voltages	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	The state of the s		13		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	16.50	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70140BB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified Characteristic Symbol **Test Conditions** Min. Typ.1 Max. Unit **Nominal Performance**  $V_{C\underline{C}}$ Supply Voltage 4.5 5.5 ٧ **Current-Sensing** I PR -20 20 Α Range  $I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V Sensitivity Sens 50 mV/A Zero-Current Output  $V_{IOUT(Q)}$ Bidirectional,  $I_P = 0$  A, VCC = 5V 2.5 Voltage **Accuracy Performance**  $I_P = I_{PR(max)}$ ,  $T_A = 25$ °C to 150°C ±0.8 -2 2 % E<sub>TOT</sub> Total Output Error<sup>2</sup> -6  $I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$ 6 % ±4 Total Output Error Components<sup>3</sup> E<sub>TOT</sub> = E<sub>SENS</sub> + 100 × V<sub>OE</sub>/(Sens × I<sub>P</sub>)  $I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$ -1.5 ±0.6 1.5 % Sensitivity Error  $I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$ -5.5 ±4 5.5 %  $I_P = 0 A$ ,  $T_A = 25$ °C to 150°C -10±5 10 mV Offset Voltage  $I_P = 0 A$ ,  $T_A = -40^{\circ}C$  to 25°C -30 30 m۷ **Lifetime Drift Characteristics** Sensitivity Error E sens\_drift -3 ±1 3 % Lifetime Drift **Total Output Error** E<sub>tot\_drift</sub> \_3 ±1

Lifetime Drift 1 Typical values with +/- are 3 sigma values

<sup>2</sup> Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70140CU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(32)	1 14			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		19-				<b>y</b>
Supply Voltage	V <sub>cc</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TAX O	0	_	20	Α
Sensitivity	Sens	PR(min) <   P <   PR(max)	7	66	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A	- ,	0.33	3=	>
Accuracy Performance		X. (A)	A			
Total Output Frrag?	E	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )		1		
0	Teles	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4	5.5	%
Official Voltages	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics					
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	16.50	-3	±1	3	%

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70140CB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance	Cylinder 1972	Total Contained in	"""	1.36.	max.	)
Supply Voltage	V <sub>CC</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	Take O	-20	-	20	Α
Sensitivity	Sens	PR(min)	7	33	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A	- ,	1.65	3=	>
Accuracy Performance		3	A			
	E .	I <sub>P</sub> = I <sub>PR(max)</sub> , T <sub>A</sub> = 25°C to 150°C	-2	±0.8	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents <sup>3</sup>	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )		1		
0 " " -	Ve de	I <sub>P</sub> = I <sub>PR(max)</sub> , T <sub>A</sub> = 25°C to 150°C	-1.5	±0.6	1.5	%
Sensitivity Error	E <sub>sens</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
05.177.11	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
Lifetime Drift Characte	ristics	The state of the s				_
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	R <sub>2</sub>	-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70150AU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(32)	110			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-				
Supply Voltage	V <sub>cc</sub>	A CONTRACTOR OF THE PROPERTY O	3	-	5.5	V
Current-Sensing Range	I <sub>PR</sub>		0	_	20	Α
Canada	0	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	52	- '	mV/A
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	80	3-	mV/A
Zero-Current Output	V	Unidirectional, I <sub>P</sub> = 0 A, VCC = 3.3V	-/3	V <sub>cc</sub> × 0.1	_	V
Voltage	$V_{IOUT(Q)}$	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>CC</sub> × 0.1		V
Accuracy Performance	. 3			1	V	/
Total Output Error <sup>2</sup>	YE	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Elloi	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ I	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )				1
One of the three Frances	F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	Esens	$I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	16.45		-		
Sensitivity Error Lifetime Drift	E sens_drift	23)	-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>		-3	±1	3	%
Typical values with +/- are 3	sigma value					

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70150AB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified		(5)	1 10			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		13-				
Supply Voltage	V <sub>CC</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	TO TO	-20	_	20	Α
Sensitivity	0	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 3.3V	7	26	-	mV/A
	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	_	40	<del>}-</del>	mV/A
Zero-Current Output	V	Bidirectional, $I_P = 0$ A, VCC = 3.3V	-/3	V <sub>cc</sub> × 0.5	-	V
Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	X-	V <sub>CC</sub> × 0.5		V
Accuracy Performance			XX	1	\ \ \	/
Tabal Outroot Fores <sup>2</sup>	YE	$I_P = I_{PR(max)}$ , $T_A = 25^{\circ}$ C to 150°C	-2	±0.8	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Co	nponents³ l	$E_{TOT} = E_{SENS} + 100 \times V_{OE}/(Sens \times I_P)$	\			3
O iti-it F	F	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
Sensitivity Error	E sens	$I_{P} = I_{PR(max)}, T_{A} = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-5.5	±4 1	5.5	%
055 41/414	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
Lifetime Drift Characte	eristics	[6,2]		}		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift		-3	±1	3	%
vnical values with +/- are	3 ciama valuo					

<sup>1</sup> Typical values with +/- are 3 sigma values 2 Percentage of IP, with IP = IPR(max).

<sup>3</sup> A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70150BU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otnerwise specified			, ,			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		10-			1	
Supply Voltage	V <sub>cc</sub>		4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	Take O	0	_	20	Α
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	80	_ ′	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A, VCC = 5V	_ ,	0.5	?=	٧
Accuracy Performance		×.	乃			
Tatal Output Finance	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	4	1		
O and this it a Ferrage	Te de	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
Officet Valtage	V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	OE	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	ristics	N. A.		13		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E tot_drift	16/23	-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70150BB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified			7 174			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		70-			-	<b>y</b>
Supply Voltage	V <sub>CC</sub>		4.5	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>		-20	-	20	Α
Sensitivity	Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$ , VCC = 5V	7	40	- '	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A, VCC = 5V	- ,	2.5	?=	V
Accuracy Performance	9	× ( )	J.			
Tatal Outsut Fam. 2	F.	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Con	mponents <sup>3</sup>	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	M ~	1		
0 " " -	T <sub>E</sub>	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
Office A Malkania	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
Lifetime Drift Characte	eristics			13		
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	Kin Control	-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70150CU Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

otherwise specified			1 10			
Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
Nominal Performance		13-	>		-	7
Supply Voltage	V <sub>CC</sub>		3	_	5.5	V
Current-Sensing Range	I <sub>PR</sub>	10%	0	_	20	Α
Sensitivity	Sens	$  _{PR(min)} <  _{P} <  _{PR(max)}$	7	52	-	mV/A
Zero-Current Output Voltage	V <sub>IOUT(Q)</sub>	Unidirectional, I <sub>P</sub> = 0 A	- ,	0.33	3=	V
Accuracy Performanc	e /		J.			
Total Output France	F .	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.7	2	%
Total Output Error <sup>2</sup>	E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
Total Output Error Co	mponents <sup>3</sup>	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	74	1		
O a martini tra Fanca	Tex-	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.7	1.5	%
Sensitivity Error	sens	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-5.5	±4	5.5	%
Official Vallacia	V	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±6	10	mV
Offset Voltage	V <sub>OE</sub>	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±8	30	mV
Lifetime Drift Characte	eristics				27	
Sensitivity Error Lifetime Drift	E sens_drift		-3	±1	3	%
Total Output Error Lifetime Drift	E <sub>tot_drift</sub>	King .	-3	±1	3	%

Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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### Preliminary datasheet REV 0.6

CH70150CB Performance Characteristics: TA Range L, valid at TA = -40°C to 150°C, unless

	(32)	1 14			
Symbol	Test Conditions	Min.	Typ. <sup>1</sup>	Max.	Unit
	10-				<b>y</b>
V <sub>cc</sub>		3	_	5.5	V
I <sub>PR</sub>	Max.	-20	_	20	Α
Sens	$I_{PR(min)} < I_{P} < I_{PR(max)}$	7	26	- '	mV/A
V <sub>IOUT(Q)</sub>	Bidirectional, I <sub>P</sub> = 0 A	- ,	1.65	3=	>
	X. (A)	A			
Total Output Error <sup>2</sup> E <sub>TOT</sub>	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-2	±0.8	2	%
	$I_P = I_{PR(max)}, T_A = -40^{\circ}C \text{ to } 25^{\circ}C$	-6	±4	6	%
nponents³ l	E <sub>TOT</sub> = E <sub>SENS</sub> + 100 × V <sub>OE</sub> /(Sens × I <sub>P</sub> )	N -	1		
Sensitivity Error E <sub>sens</sub>	$I_P = I_{PR(max)}, T_A = 25^{\circ}C \text{ to } 150^{\circ}C$	-1.5	±0.6	1.5	%
	$I_P = I_{PR(max)}$ , $T_A = -40$ °C to 25°C	-5.5	±4	5.5	%
Offset Voltage V <sub>OE</sub>	I <sub>P</sub> = 0 A, T <sub>A</sub> = 25°C to 150°C	-10	±5	10	mV
	$I_P = 0 \text{ A}, T_A = -40^{\circ}\text{C to } 25^{\circ}\text{C}$	-30	±6	30	mV
ristics			1.3	2	
E sens_drift	100	-3	±1	3	%
E tot_drift	16.72	-3	±1	3	%
	V <sub>CC</sub> I <sub>PR</sub> Sens V <sub>IOUT(Q)</sub> E <sub>TOT</sub> Inponents <sup>3</sup> I E <sub>sens</sub> V <sub>OE</sub> ristics E <sub>sens_drift</sub> E <sub>tot_drift</sub>	$\begin{array}{c c} V_{CC} & & & & & & & & & & & & & & & & & & $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

<sup>1</sup> Typical values with +/- are 3 sigma values
2 Percentage of IP, with IP = IPR(max).
3 A single part will not have both the maximum/minimum sensitivity error and maximum/minimum offset voltage, as that would violate the maximum/minimum total output error specification. Also, 3 sigma distribution values are combined by taking the square root of the sum of the squares. See Application Information section.



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## **6 Characteristics Performance**



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## 7 Function Description

### 7.1 General Function

The CH701 is programmable Hall-Effect Linear current sensor. The current flowing through the primary side current path induces a corresponding magnetic field measured by a build-in Hall plate. The magnetic flux through the Hall plate is proportional to the primary current. And the output signal amplified and filtered from Hall voltage induced is proportional the sensed current. The output signal also can be proportional to the supply voltage (ratio-metric behavior) as long as the analog output mode is selected.

The sensitivity and offset can be adjusted by programming the EEPROM registers. And the temperature characteristics of sensitivity and offset of Hall plate will be compensated by the coefficients stored in the EEPROM memory. Then the output voltage signal will have a good linear and temperature characteristic with the sensed current.

Futuremore the several parameters like Unidirectional/Bidirectional current, output voltage range and input voltage range, Application Information

## 8 Application Information

### 8.1 Estimating Total Error vs. Sensed Current

The Performance Characteristics tables give distribution ( $\pm 3$ sigma) values for Total Error at  $_{IPR(max)}$ ; however, one often wants to know what error to expect at a particular current. This can be estimated by using the distribution data for the components of Total Error, Sensitivity Error, and Offset Voltage. The  $\pm 3$  sigma value for Total Error ( $E_{TOT}$ ) as a function of the sensed current ( $I_P$ ) is estimated as:

$$E_{TOT}(I_P) = \sqrt{E_{SENS}^2 + \left(\frac{100 \times V_{OE}}{Sens \times I_P}\right)^2}$$

Here,  $E_{SENS}$  and  $V_{OE}$  are the  $\pm 3$  sigma values for those error terms. If there is an average sensitivity error or average offset voltage, then the average Total Error is estimated as:

$$E_{TOT_{AVG}}(I_P) = E_{SENS_{AVG}} + \frac{100 \times V_{OE_{AVG}}}{Sens \times I_P}$$

The resulting total error will be a sum of E<sub>TOT</sub> and E<sub>TOT\_AVG</sub>. Using these equations and the 3 sigma distributions for Sensitivity Error and Offset Voltage, the Total Error versus sensed current (I<sub>P</sub>) is below for the CH70120AB. As expected, as one goes towards zero current, the error in percent goes towards infinity due to division by zero.

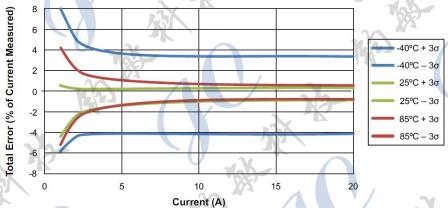


Figure 1: Predicted Total Error as a Function of the Sensed Current for the CH70120AB



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### 8.2 Definitions of accuracy characteristics

**Sensitivity (Sens).** The change in sensor IC output in response to a 1 A change through the primary conductor. The sensitivity is the product of the magnetic circuit sensitivity (G/A) (1 G = 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.

**Nonlinearity (E**<sub>LIN</sub>). The nonlinearity is a measure of how linear the output of the sensor IC is over the full current measurement range. The nonlinearity is calculated as:

$$E_{LIN} = \left\{ 1 - \left[ \frac{V_{IOUT} \left( I_{PR(max)} \right) - V_{IOUT_{(Q)}}}{2 \times V_{IOUT} \left( I_{PR(max)} / 2 \right) - V_{IOUT_{(Q)}}} \right] \right\} \times 100(\%)$$

where  $V_{\text{IOUT}}(I_{\text{PR}(\text{max})})$  is the output of the sensor IC with the maximum measurement current flowing through it and  $V_{\text{IOUT}}(I_{\text{PR}(\text{max})}/2)$  is the output of the sensor IC with half of the maximum measurement current flowing through it.

**Zero-Current Output Voltage (V**<sub>IOUT(Q)</sub>). The output of the sensor when the primary current is zero. For a unipolar supply voltage, it nominally remains at  $0.5 \times V_{CC}$  for a bidirectional device and  $0.1 \times V_{CC}$  for a unidirectional device. For example, in the case of a bidirectional output device,  $V_{CC} = 5 \text{ V}$  translates into  $V_{IOUT(Q)} = 2.5 \text{ V}$ . Variation in  $V_{IOUT(Q)}$  can be attributed to the resolution of the linear IC quiescent voltage trim and thermal drift.

**Offset Voltage (V<sub>OE</sub>).** The deviation of the device output from its ideal quiescent value of  $0.5 \times V_{CC}$  (bidirectional) or  $0.1 \times V_{CC}$  (unidirectional) due to nonmagnetic causes. To convert this voltage to amperes, divide by the device sensitivity, Sens.

**Total Output Error (E**<sub>TOT</sub>). The difference between the current measurement from the sensor IC and the actual current (I<sub>P</sub>), 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:

$$E_{TOT}(I_P) = \frac{V_{IOUT\_ideal}(I_P) - V_{IOUT}(I_P)}{Sens_{ideal}(I_P) \times I_P} \times 100(\%)$$

The Total Output Error incorporates all sources of error and is a function of  $I_P$ . At relatively high currents,  $E_{TOT}$  will be mostly due to sensitivity error, and at relatively low currents,  $E_{TOT}$  will be mostly due to Offset Voltage ( $V_{OE}$ ). In fact, at  $I_P = 0$ ,  $E_{TOT}$  approaches infinity due to the offset. This is illustrated in Figures 2 and 3. Figure 2 shows a distribution of output voltages versus  $I_P$  at 25°C and across temperature. Figure 3 shows the corresponding  $E_{TOT}$  versus  $I_P$ .

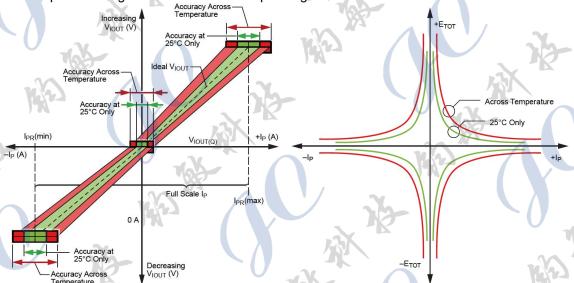


Figure 2: Output Voltage versus Sensed Current
Sensitivity Ratiometry Coefficient (SENS\_RAT\_COEF). The coefficient defines how the sensitivity scales with  $V_{CC}$ . The ideal coefficient is 1, meaning the sensitivity scales proportionally with  $V_{CC}$ . A 10% increase in  $V_{CC}$  results in a 10% increase in sensitivity. A coefficient of 1.1 means that the



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sensitivity increases by 10% more than the ideal proportionality case. This means that a 10% increase in V<sub>CC</sub> results in an 11% increase in sensitivity. This relationship is described by the following equation:

$$Sens(V_{CC}) = Sens(5V) \left[ 1 + \frac{(V_{CC} - 5V) \times SENS\_RAT\_COEF}{5V} \right]$$

This can be rearranged to define the sensitivity ratiometry coefficient as:

$$SENS_{RAT_{COEF}} = \left[ \frac{Sens(V_{CC})}{Sens(5V)} - 1 \right] \times \frac{5V}{V_{CC} - 5V}$$

**Zero-Current Output Ratiometry Coefficient (QVO\_RAT\_ COEF).** The coefficient defines how the zero-current output voltage scales with  $V_{CC}$ . The ideal coefficient is 1, meaning the output voltage scales proportionally with  $V_{CC}$ , always being equal to  $V_{CC}/2$ . A coefficient of 1.1 means that the zero-current output voltage increases by 10% more than the ideal proportionality case. This means that a 10% increase in  $V_{CC}$  results in an 11% increase in the zero-current output voltage. This relationship is described by the following equation:

VIOUTQ(
$$V_{CC}$$
) = VIOUTQ(5 $V$ )  $\left[1 + \frac{(V_{CC} - 5V) \times QVO\_RAT\_COEF}{5V}\right]$ 

This can be rearranged to define the zero-current output ratiometry coefficient as:

$$QVO\_RAT\_COEF = \left[\frac{VIOUTQ(V_{CC})}{VIOUTQ(5V)} - 1\right] \times \frac{5V}{V_{CC} - 5V}$$

## 8.3 Definitions of dynamic response characteristics

**Power-On Time (tPO).** When the supply is ramped to its operating voltage, the device requires a finite time to power its internal components before responding to an input magnetic field. Power-On Time, tpo, is defined as the time it takes for the output voltage to settle within  $\pm 10\%$  of its steady-state value under an applied magnetic field, after the power supply has reached its minimum specified operating voltage,  $V_{CC(min)}$ , as shown in the chart at right.

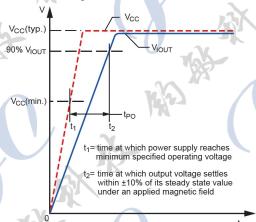


Figure 4: Power-On Time

Rise Time ( $t_r$ ). The time interval between a) when the sensor IC reaches 10% of its full-scale value, and b) when it reaches 90% of its full-scale value. The rise time to a step response is used to derive the bandwidth of the current sensor IC, in which  $f(-3 \text{ dB}) = 0.35 / t_r$ . Both  $t_r$  and  $t_{RESPONSE}$  are detrimentally affected by eddy-current losses observed in the conductive IC ground plane. **Propagation Delay (t\_{pd}).** The propagation delay is measured as the time interval a) when the primary current signal reaches 20% of its final value, and b) when the device reaches 20% of its output corresponding to the applied current.



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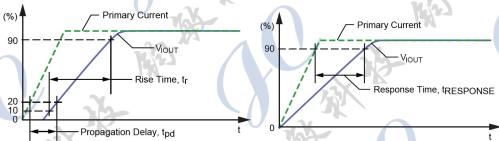


Figure 5: Rise Time and Propagation Delay

Figure 6: Response Time

**Response Time (tresponse).** The time interval between a) when the primary current signal reaches 90% of its final value, and b) when the device reaches 90% of its output corresponding to the applied current.



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## 9 Package Information:

For Reference Only - Not for Tooling Use

(Reference MS-012AA)

Dimensions in millimeters - NOT TO SCALE

Dimensions exclusive of mold flash, gate burrs, and dambar protrusions

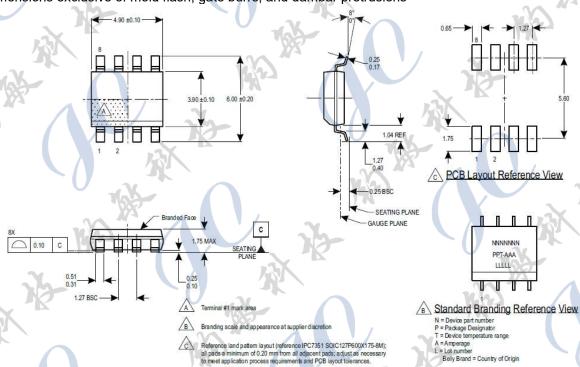


Figure 7: Package LC, 8-pin SOICN

Reference land pattern layout (reference IPC7351 SOIC127P600X175-8M);
all pads a minimum of 0.20 mm from all adjacent pads; adjust as necessary
to meet application process requirements and PCB layout tolerances.



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