

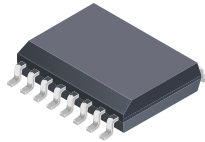
## 400 kHz, High Accuracy Current Sensor with Pin-Selectable Gains and Adjustable Overcurrent Fast Fault in SOICW-16 Package

### FEATURES AND BENEFITS

- High operating bandwidth for fast control loops or where high-speed currents are monitored
  - 400 kHz bandwidth
  - 2  $\mu$ s typical response time
- High accuracy
  - As low as 1% maximum sensitivity error over temperature (K series)
  - 6 mV maximum offset voltage over temperature
  - Non-ratiometric operation with  $V_{REF}$  output
  - Low noise LA package
    - 124 mV<sub>RMS</sub> for 3.3 V supply
    - 160 mV<sub>RMS</sub> for 5 V supply
  - Differential sensing for high immunity to external magnetic fields
  - No magnetic hysteresis
- Adjustable fast overcurrent alert
  - 1  $\mu$ s typical response time
  - Pin adjustable threshold
- Externally configurable gain settings using two logic pins

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**PACKAGE:** 16-Pin SOICW (suffix MA/LA)



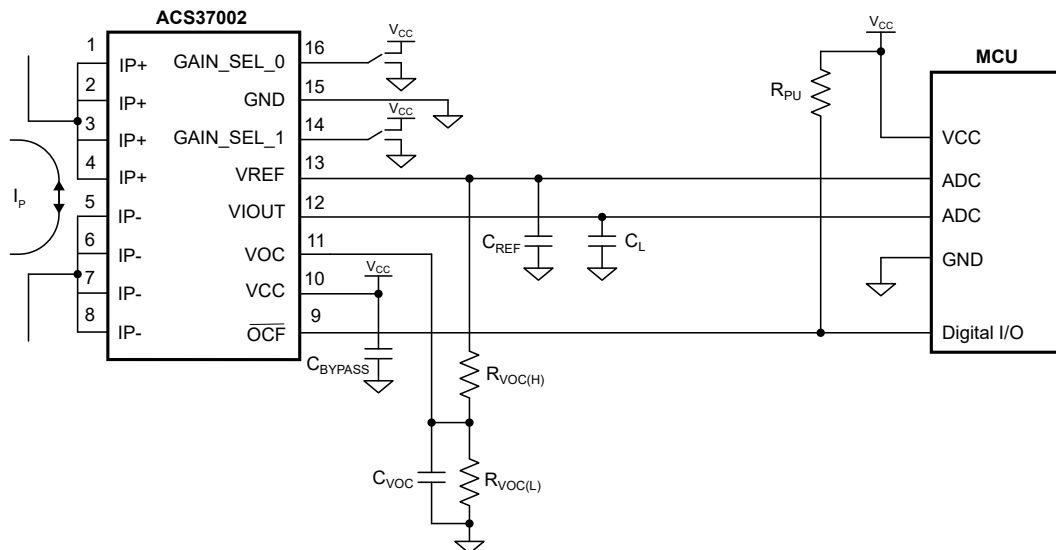
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### DESCRIPTION

The ACS37002 is a fully integrated Hall-effect current sensor in an SOICW-16 package that is factory-trimmed to provide high accuracy over the entire operating range without the need for customer programming. The current is sensed differentially by two Hall plates that subtract out interfering external common-mode magnetic fields.

The package construction provides high isolation by magnetically coupling the field generated by the current in the conductor to the monolithic Hall sensor IC which has no physical connection to the integrated current conductor. The MA package is optimized for higher isolation with withstand voltage, 4.8 kV<sub>RMS</sub>, and 0.85 m $\Omega$  conductor resistance. The LA package is optimized for lower noise with 3.6 kV<sub>RMS</sub> with stand voltage and 1 m $\Omega$  conductor resistance.

The fast overcurrent alert fault output has a user-configurable threshold by an analog input, providing short-circuit detection and enhanced system protection. The sensor also has four user-selectable gain options with two logic inputs without the need for extra components. This reduces the need to stock inventory of individual devices with different gain. The analog output with  $V_{REF}$  pin is for use in noisy supply environments.



**Figure 1: Typical Bidirectional Application.**  
For more application circuits, refer to the application circuit section.

### FEATURES AND BENEFITS (continued)

- 4 adjustable gain levels for increased design flexibility
- Enabling measurement ranges from 10 to 133 A in both unidirectional and bidirectional modes
- Low internal primary conductor resistance 0.85 mΩ (MA) and 1 mΩ (LA) for better power efficiency
- UL-certified to 60950 standard, highly isolated compact SOICW-16 surface mount package (MA)
  - 4.8 kV<sub>RMS</sub> rated isolation voltage
  - 1047 V<sub>RMS</sub> / 1480 V<sub>DC</sub> basic isolation voltages
  - 517 V<sub>RMS</sub> / 730 V<sub>DC</sub> reinforced isolation voltages
- Wide operating temperature, -40°C to 150°C
- Commercial qualified



### SELECTION GUIDE

Part Number	Current Sensing Range, I <sub>PR</sub> (A)	Sensitivity [1] Sens (mV/A)	Nominal V <sub>CC</sub> (V)	Optimized Temp. Range T <sub>A</sub> (°C)	Packing [2]
<b>MA Package, 16-Pin SOICW</b>					
ACS37002LMABTR-050B5	±33, ±40, ±50, ±66	60, 50, 40, 30	5	-40 to 150 [3]	1000 pieces per 13-inch reel
ACS37002LMABTR-066B5	±66, ±80, ±100, ±133	30, 25, 20, 15			
ACS37002LMABTR-050U5	33, 40, 50, 66	120, 100, 80, 60			
ACS37002LMABTR-066U5	66, 80, 100, 133	60, 50, 40, 30			
ACS37002LMABTR-050B3	±33, ±40, ±50, ±66	39.6, 33, 26.4, 19.8	3.3		
ACS37002LMABTR-066B3	±66, ±80, ±100, ±133	19.8, 16.5, 13.2, 9.9			
ACS37002LMABTR-050U3	33, 40, 50, 66	79.2, 66, 52.8, 39.6			
ACS37002LMABTR-066U3	66, 80, 100, 133	39.6, 33, 26.4, 19.8			
ACS37002KMABTR-050B5	±33, ±40, ±50, ±66	60, 50, 40, 30	5	-40 to 125 [4]	
ACS37002KMABTR-050B3	±33, ±40, ±50, ±66	39.6, 33, 26.4, 19.8	3.3		
<b>LA Package [3], 16-Pin SOICW</b>					
ACS37002LLAATR-015B5	±10, ±12, ±15, ±20	200, 166.6, 133.3, 100	5	-40 to 150	1000 pieces per 13-inch reel
ACS37002LLAATR-025B5	±25, ±30, ±37.5, ±50	80, 66.6, 53.3, 40			
ACS37002LLAATR-015B3	±10, ±12, ±15, ±20	132, 110, 88, 66	3.3		
ACS37002LLAATR-025U3	+25, +30, +37.5, +50	105.6, 88, 70.4, 52.8			

[1] Refer to the part specific performance characteristics sections for Gain\_Sel configuration.

[2] Contact Allegro for additional options.

[3] Advanced information. LA package and LMA variation is not yet released.

[4] The device performance is optimized from -40°C to 125°C; however, the device can still operate to an ambient temperature of 150°C. The device shares the same qualifications as the L temperature devices unless otherwise stated.

### Table of Contents

Features and Benefits.....	1	Full Scale (FS).....	28
Description.....	1	Nonlinearity ( $E_{LIN}$ ).....	28
Packages.....	1	Total Output Error ( $E_{TOT}$ ).....	29
Selection guide.....	2	Power Supply Offset Error ( $V_{PS}$ ).....	29
Absolute Maximum Ratings.....	4	Offset Power Supply Rejection Ratio (PSRRO).....	29
Isolation Characteristics.....	4	Power Supply Sensitivity Error (EPS).....	29
MA Package Specific Performance.....	4	Sensitivity Power Supply Rejection Ratio (PSRRS).....	29
LA Package Specific Performance.....	4	Fault Behavior.....	30
Pinout Diagram and Terminal List.....	5	Overcurrent Fault (OCF).....	30
Functional Block Diagram.....	6	Overcurrent Fault Operating Range/Point	
Common Electrical Characteristics.....	7	( $I_{OCF-OR}$ , $I_{OCF-OP}$ ).....	30
Performance Characteristics.....	10	Overcurrent Fault Hysteresis ( $I_{OCF-Hyst}$ ).....	30
Functional Description.....	24	Voltage Overcurrent Pin (VOC).....	30
Power-On Reset Operation.....	24	Overcurrent Fault Error ( $E_{OCF}$ ).....	31
Power-On.....	24	Overcurrent Fault Response Time ( $t_{OCF}$ ).....	31
Power-Off.....	24	Overcurrent Fault Reaction Time ( $t_{OCF-R}$ ).....	31
Power-On Timing.....	24	Overcurrent Fault Mask Time ( $t_{OCF-MASK}$ ).....	31
Power-On Reset (POR).....	24	Overcurrent Fault Hold Time ( $t_{OCF-HOLD}$ ).....	31
Overvoltage and Undervoltage Detection.....	25	Overcurrent Fault Persist.....	31
Undervoltage Detection Voltage Thresholds ( $V_{UVD(H/L)}$ ).....	25	OCF Disable.....	31
Overvoltage Detection Voltage Thresholds ( $V_{OVD(H/L)}$ ).....	25	Dynamic Response Parameters.....	32
Overvoltage/Undervoltage Detection		Propagation Time ( $t_{pd}$ ).....	32
Hysteresis ( $V_{OVDHys}$ , $V_{UVDHys}$ ).....	26	Rise Time ( $t_r$ ).....	32
Overvoltage and Undervoltage Enable and		Response Time ( $t_{RESPONSE}$ ).....	32
Disable Time ( $t_{OVD(E/D)}$ , $t_{UVD(E/D)}$ ).....	26	Overshoot.....	32
Supply Zener Clamp Voltages.....	26	Settling Time.....	32
Absolute Maximum Ratings.....	26	Temperature Compensation.....	32
Forward and Reverse Supply Voltage.....	26	Temperature Compensation Update Rate.....	32
Forward and Reverse Output Voltage.....	26	Application and Theory.....	33
Forward and Reverse Reference/Fault Voltage.....	26	Application Circuits.....	33
Output Source and Sink Current.....	26	Theory and Functionality – VOC and OCF.....	34
Definitions of Operating and Performance Characteristics.....	27	VOC Driven by Non-Inverting Buffered VREF.....	34
Zero Current Voltage Output ( $V_{IOUT(Q)}$ , QVO).....	27	Power Supply Decoupling Capacitor and	
QVO Temperature Drift ( $V_{QE}$ ).....	27	Output Capacitive Loads.....	34
Reference Voltage ( $V_{REF}$ ).....	27	Dynamically Change Gain in a System.....	35
Reference Voltage Temperature Drift (VRE).....	27	Thermal Performance.....	36
Offset Voltage (VOE).....	27	Thermal Rise vs. Primary Current.....	36
Output Saturation Voltage ( $V_{SAT(HIGH/LOW)}$ ).....	27	Evaluation Board Layout.....	36
Sensitivity (Sens).....	28	Package Outline Drawings.....	37
Sensitivity Error ( $E_{sens}$ ).....	28	MA Package.....	37
Gain Selection Pins.....	28	LA Package.....	38

### ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Notes	Rating	Unit
Forward Supply Voltage	$V_{CC}$		6.5	V
Reverse Supply Voltage	$V_{RCC}$		-0.5	V
Forward Output Voltage	$V_{OUT}$	Applies to $V_{IOUT}$ , $V_{OCF}$ , and $V_{REF}$	$(V_{CC} + 0.7) \leq 6.5$	V
Reverse Output Voltage	$V_{ROUT}$	Applies to $V_{IOUT}$ , $V_{OCF}$ , and $V_{REF}$	-0.5	V
Forward Input Voltage	$V_{OI}$	Applies to GAIN_SEL0, GAIN_SEL1, and VOC	$(V_{CC} + 0.7) \leq 6.5$	V
Reverse Input Voltage	$V_{RI}$	Applies to GAIN_SEL0, GAIN_SEL1, and VOC	-0.5	V
Operating Ambient Temperature	$T_A$		-40 to 150	°C
Storage Temperature	$T_{stg}$		-65 to 165	°C
Maximum Junction Temperature	$T_{J(max)}$		165	°C

### ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Rating	Unit
Surge Voltage	$V_{SURGE}$	1.2/50 $\mu$ s to IEC 61000-4-5	10	kV
Surge Current [1]	$I_{SURGE}$	8/20 $\mu$ s to IEC 61000-4-5	13	kA
Comparative Track Index	CTI	Material Group II	400 to 599	V

### MA PACKAGE SPECIFIC PERFORMANCE

Distance Through Insulation	DTI	Minimum internal distance through insulation	90	$\mu$ m
Dielectric Strength Test Voltage	$V_{ISO}$	Agency type-tested for 60 seconds per UL 60950-1 (edition 2). Production tested at 3000 $V_{RMS}$ for 1 second in accordance with UL 60950-1.	4800	$V_{RMS}$
Working Voltage for Basic Isolation [1]	$V_{WVBI}$	Maximum approved working voltage for basic (single) isolation according to UL 60950-1 (edition 2)	1480	$V_{PK}$ or $V_{DC}$
			1047	$V_{RMS}$
Working Voltage for Reinforced Isolation [1]	$V_{WVRI}$	Maximum approved working voltage for reinforced isolation according to UL 60950-1 (edition 2)	730	$V_{PK}$ or $V_{DC}$
			517	$V_{RMS}$
Clearance [1]	$D_{cl}$	Minimum distance through air from IP leads to signal leads	7.5	mm
Creepage [1]	$D_{cr}$	Minimum distance along package body from IP leads to signal leads	7.9	mm

### LA PACKAGE SPECIFIC PERFORMANCE

Distance Through Insulation	DTI	Minimum internal distance through insulation	45	$\mu$ m
Dielectric Strength Test Voltage	$V_{ISO}$	Agency type-tested for 60 seconds per UL 60950-1 (edition 2). Production tested at 3000 $V_{RMS}$ for 1 second in accordance with UL 60950-1.	3600	$V_{RMS}$
Working Voltage for Basic Isolation [1]	$V_{WVBI}$	Maximum approved working voltage for basic (single) isolation according to UL 60950-1 (edition 2)	870	$V_{PK}$ or $V_{DC}$
			616	$V_{RMS}$
Clearance [1]	$D_{cl}$	Minimum distance through air from IP leads to signal leads	7.5	mm
Creepage [1]	$D_{cr}$	Minimum distance along package body from IP leads to signal leads	7.5	mm

[1] Certification pending.

### PINOUT DIAGRAM AND TERMINAL LIST TABLE

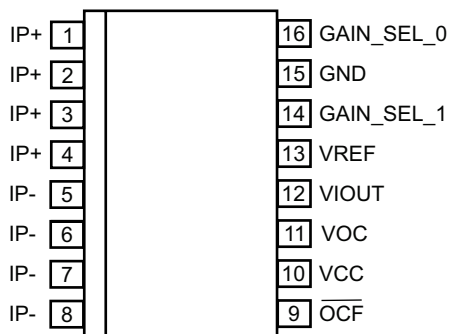
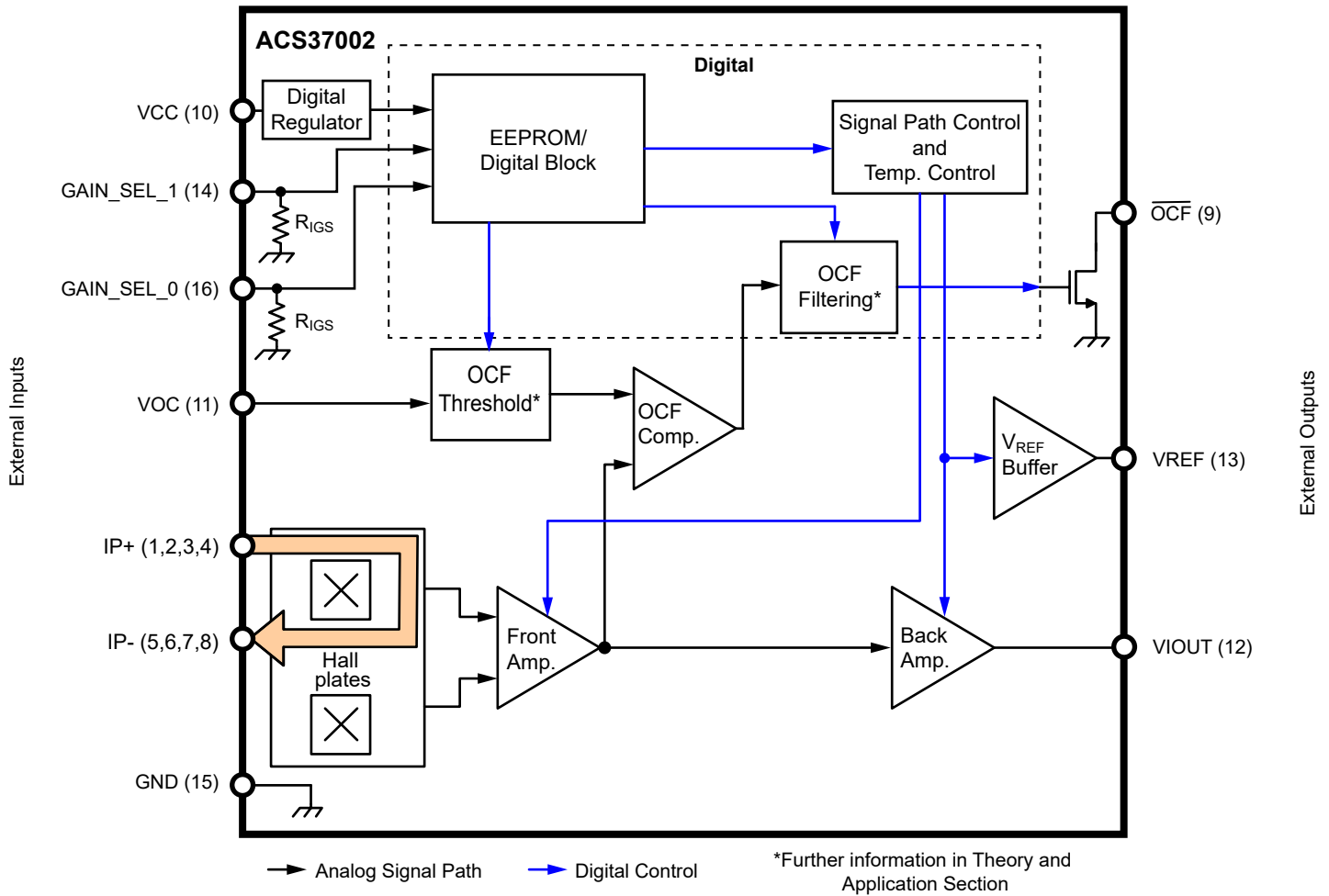


Figure 2: MA/LA Pinout Diagram

#### Terminal List Table

Number	Name	Description
1, 2, 3, 4	IP+	Terminals for current being sensed; fused internally
5, 6, 7, 8	IP-	Terminals for current being sensed; fused internally
9	OCF	Overcurrent fault, open-drain
10	VCC	Device power supply terminal
11	VOC	Overcurrent fault operation point input
12	VIOUT	Analog output representing the current flowing through I <sub>p</sub>
13	VREF	Zero current voltage reference
14	GAIN_SEL_1	Gain selection bit 1
15	GND	Device ground terminal
16	GAIN_SEL_0	Gain selection bit 0



**Figure 3: Functional Block Diagram**

**COMMON ELECTRICAL CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$  or  $3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Supply Voltage	$V_{\text{CC}}$	5 V devices only	4.5	5	5.5	V
		3.3 V devices only	3	3.3	3.6	V
Supply Current	$I_{\text{CC}}$	No load on VIOUOUT or VREF; $V_{\text{CC}} = 5 \text{ V}$	–	13	18	mA
		No load on VIOUOUT or VREF; $V_{\text{CC}} = 3.3 \text{ V}$	–	12	15	mA
Supply Bypass Capacitor	$C_{\text{BYPASS}}$	VCC to GND recommended	–	0.1	–	$\mu\text{F}$
Output Resistive Load	$R_{\text{L}}$	VIOUOUT to GND, VIOUOUT to VCC	10	–	–	k $\Omega$
Output Capacitive Load	$C_{\text{L}}$	VIOUOUT to GND	–	1	6	nF
Reference Resistive Load	$R_{\text{VREF}}$	VREF to GND (recommended for VOC supply); VREF to VCC	10	62.7	–	k $\Omega$
Reference Capacitive Load	$C_{\text{VREF}}$	VREF to GND	–	–	6	nF
Fault Pull-Up Resistance	$R_{\text{PU}}$		4.7	–	500	k $\Omega$
VOC Capacitive Load	$C_{\text{VOC}}$	VOC to GND	–	–	1	nF
Primary Conductor Resistance	$R_{\text{IP}}$	$T_A = 25^\circ\text{C}$	–	0.85	–	m $\Omega$
Primary Conductor Inductance	$L_{\text{IP}}$		–	4.2	–	nH
Power-On Reset Voltage	$V_{\text{POR(H)}}$	$T_A = 25^\circ\text{C}$ , $V_{\text{CC}}$ rising [1]	2.6	2.9	3.2	V
	$V_{\text{POR(L)}}$	$T_A = 25^\circ\text{C}$ , $V_{\text{CC}}$ falling [1]	2.2	2.5	2.8	V
POR Hysteresis	$V_{\text{POR(HYS)}}$		250	–	–	mV
Power-On Time	$t_{\text{POD}}$	Time from $V_{\text{CC}}$ rising $\geq V_{\text{UVD(DIS)}}$ after a POR event until power-on; VREF, OCF, VIOUOUT	–	100	–	$\mu\text{s}$
Undervoltage Detection (UVD) Threshold [2]	$V_{\text{UVD(L)}}$	$T_A = 25^\circ\text{C}$ , $V_{\text{CC}}$ falling [1]	3.8	–	4.3	V
	$V_{\text{UVD(H)}}$	$T_A = 25^\circ\text{C}$ , $V_{\text{CC}}$ rising [1]	4	–	4.5	V
UVD Hysteresis [2]	$V_{\text{UVD(HYS)}}$		–	250	–	mV
UVD Delay Time [2]	$t_{\text{dUVD(E)}}$	Time from $V_{\text{CC}}$ falling $\leq V_{\text{UVD(EN)}}$ until UVD asserts	35	64	120	$\mu\text{s}$
	$t_{\text{dUVD(D)}}$	Time from $V_{\text{CC}}$ rising $\geq V_{\text{UVD(DIS)}}$ until UVD clears	–	7	–	$\mu\text{s}$
Overvoltage Detection (OVD) Threshold	$V_{\text{OVD(H)}}$	$T_A = 25^\circ\text{C}$ , $V_{\text{CC}}$ rising [1]	6.1	6.3	6.8	V
	$V_{\text{OVD(L)}}$	$T_A = 25^\circ\text{C}$ , $V_{\text{CC}}$ falling [1]	5.6	5.8	6.1	V
Overvoltage Detection Hysteresis	$V_{\text{OVD(HYS)}}$		–	660	–	V
OVD Delay Time	$t_{\text{dOVD(E)}}$	Time from $V_{\text{CC}}$ rising $\geq V_{\text{OVD(EN)}}$ until OVD asserts	35	90	120	$\mu\text{s}$
	$t_{\text{dOVD(D)}}$	Time from $V_{\text{CC}}$ falling $\leq V_{\text{OVD(DIS)}}$ until OVD clears	–	7	–	$\mu\text{s}$

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**COMMON PERFORMANCE CHARACTERISTICS (V<sub>IOUT</sub>):** Valid through full operating temperature range, T<sub>A</sub> = -40°C to 150°C, C<sub>BYPASS</sub> = 0.1 μF, and V<sub>CC</sub> = 5 V or 3.3 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units	
<b>OUTPUT SIGNAL CHARACTERISTICS (V<sub>IOUT</sub>)</b>							
Saturation Voltage	V <sub>SAT(H)</sub>	R <sub>L</sub> = 10 kΩ to GND	V <sub>CC</sub> - 0.25	-	-	V	
	V <sub>SAT(L)</sub>	R <sub>L</sub> = 10 kΩ to V <sub>CC</sub>	-	-	0.15	V	
Output Operating Range	V <sub>OOR</sub>	5 V linear operating range	0.5	-	4.5	V	
		3.3 V linear operating range	0.3	-	3.0	V	
Output Current Limit	I <sub>OUT(src)</sub>	V <sub>IOUT</sub> shorted to GND	-	25	-	mA	
	I <sub>OUT(snk)</sub>	V <sub>IOUT</sub> shorted to V <sub>CC</sub>	-	25	-	mA	
Output Drive	I <sub>OUT</sub>		4.8	-	-	mA	
Internal Bandwidth	BW	Small signal -3 dB, C <sub>L</sub> = 5.7 nF	-	400	-	kHz	
Rise Time	t <sub>R</sub>	T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF, 10%-90% of 1 V output swing	-	1	2.5	μs	
Response Time	t <sub>RESPONSE</sub>	T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF, 90% input to 90% of 1 V output swing	-	2	2.5	μs	
Propagation Delay	t <sub>pd</sub>	T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF, 20% input to 20% of 1 V output swing	-	1	2	μs	
Noise Density	I <sub>ND</sub>	Input-referenced noise density; T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF; V <sub>CC</sub> = 5 V	MA Package	-	350	-	μA/√Hz
			LA Package	-	155	-	μA/√Hz
		Input-referenced noise density; T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF; V <sub>CC</sub> = 3.3 V	MA Package	-	450	-	μA/√Hz
			LA Package	-	155	-	μA/√Hz
Noise	I <sub>N</sub>	Input-referenced noise at 400 kHz; T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF; V <sub>CC</sub> = 5 V	MA Package	-	277	-	mA <sub>RMS</sub>
			LA Package	-	124	-	mA <sub>RMS</sub>
		Input-referenced noise at 400 kHz; T <sub>A</sub> = 25°C, C <sub>L</sub> = 5.7 nF; V <sub>CC</sub> = 3.3 V	MA Package	-	357	-	mA <sub>RMS</sub>
			LA Package	-	160	-	mA <sub>RMS</sub>
Nonlinearity	E <sub>LIN</sub>		-	±0.75	-	%	
Power Supply Rejection Ratio Offset	PSSR <sub>(O)</sub>	DC to 1 kHz, 100 mV pk-pk ripple around V <sub>CC</sub> = 5 V, I <sub>P</sub> = 0 A, change in V <sub>OE</sub>	-	-40	-	dB	
		1 to 100 kHz, 100 mV pk-pk ripple around V <sub>CC</sub> = 5 V, I <sub>P</sub> = 0 A, change in V <sub>OE</sub>	-	-30	-	dB	
Power Supply Rejection Ratio Sens	PSSR <sub>(S)</sub>	DC to 1 kHz, 100 mV pk-pk ripple around V <sub>CC</sub> = 5 V, I <sub>P</sub> = I <sub>PR(MAX)</sub> , change in Sens	-	-15	-	dB	
		1 to 100 kHz, 100 mV pk-pk ripple around V <sub>CC</sub> = 5 V, I <sub>P</sub> = I <sub>PR(MAX)</sub> , change in Sens	-	-6	-	dB	
Power Supply Offset Error	V <sub>OE(PS)</sub>	V <sub>CC</sub> @ V <sub>CC(MIN)</sub> or V <sub>CC(MAX)</sub>	-10	-	10	mV	
Power Supply Sensitivity Error	E <sub>SENS(PS)</sub>	V <sub>CC</sub> @ V <sub>CC(MIN)</sub> or V <sub>CC(MAX)</sub>	-1.5	-	1.5	%	
Common-Mode Field Rejection	CMFR	Input-referred error due to common-mode field	-	4	-	mA/G	

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**COMMON PERFORMANCE CHARACTERISTICS (VREF, FAULT, GAIN\_SEL):** Valid through full operating temperature range,  $T_A = -40^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$  or  $3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>REFERENCE OUTPUT CHARACTERISTICS (VREF)</b>						
Zero Current Reference Voltage	$V_{\text{REF(BI)}}$	Bidirectional; $V_{\text{CC}} = 5 \text{ V}$	2.49	2.5	2.51	V
		Bidirectional; $V_{\text{CC}} = 3.3 \text{ V}$	1.64	1.65	1.66	V
	$V_{\text{REF(UNI)}}$	Unidirectional; $V_{\text{CC}} = 5 \text{ V}$	0.49	0.5	0.51	V
		Unidirectional; $V_{\text{CC}} = 3.3 \text{ V}$	0.32	0.33	0.34	V
Reference Source Current Limit	$I_{\text{REF(SRC)}}$	Maximum current $V_{\text{REF}}$ can passively source	–	25	–	mA
	$I_{\text{REF(SNK)}}$	Maximum current $V_{\text{REF}}$ can passively sink	–	–25	–	mA
Reference Slew Rate	$\text{SR}_{\text{REF}}$	$C_{\text{VREF}} = 0 \text{ nF}$ , $R_{\text{VREF}} = 0 \Omega$	0.8	–	–	V/ $\mu\text{s}$
<b>OVERCURRENT FAULT CHARACTERISTICS (OCF)</b>						
OCF On Voltage	$V_{\text{FAULT-ON}}$	$R_{\text{PU}} = 4.7 \text{ k}\Omega$ , under fault condition	–	0.07	0.4	V
OCF Sink Current	$I_{\text{OCF(SNK)}}$	No Fault	–	100	–	nA
		Fault Assertion	0.01	–	1.1	mA
VOC Operating Voltage Range	$V_{\text{VOC}}$		0.2	–	2	V
Fault Error	$E_{\text{OCF}}$		–10	$\pm 3$	10	% $I_{\text{OCF-OP}}$
OCF Hysteresis	$I_{\text{OCF(HYS)}}$	$V_{\text{CC}} = 5 \text{ V}$	–	6	–	%FS
		$V_{\text{CC}} = 3.3 \text{ V}$	–	9	–	%FS
OCF Reaction Time	$t_{\text{OCF-R}}$	Time from $I_{\text{OCF-OP}}$ , with a $1.2 \times I_{\text{OCF-OP}}$ until fault asserts	–	1	1.5	$\mu\text{s}$
OCF Mask	$t_{\text{OCF-MASK}}$	Time $I_{\text{OCF-OP}}$ must be present after $t_{\text{OCF-R}}$ for fault assertion [3]	0	0.5	3	$\mu\text{s}$
OCF Response Time	$t_{\text{OCF}}$	$t_{\text{OCF-MASK}} = 0.5 \mu\text{s}$	–	1.5	2	$\mu\text{s}$
OCF Hold Time	$t_{\text{OCF-HOLD}}$	Minimum duration of FAULT assertion [3]	0	0	5	ms
<b>GAIN SELECTION PIN CHARACTERISTICS (GAIN_SEL0, GAIN_SEL1)</b>						
Gain Select Internal Resistor	$R_{\text{GSint}}$		–	1	–	M $\Omega$
GAIN_SEL Logic Input Voltage	$V_{\text{H(SEL)}}$	$V_{\text{CC}} = 5 \text{ V}$	3.75	–	–	V
		$V_{\text{CC}} = 3.3 \text{ V}$	2.25	–	–	V
	$V_{\text{L(SEL)}}$		–	–	0.5	V
Leakage Current	$I_{\text{SEL(SNK)}}$		–	–	$\pm 10$	$\mu\text{A}$

[1]  $V_{\text{CC}}$  rate +1 V/ms, for best accuracy.

[2] Only enabled on 5V devices.

[3] Typical value is factory default;

ACS37002LMA-050B5 Gain\_Sel Pin Performance Key

ACS37002LMA-050B5 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	40	50
	0	1	50	40
	1	0	60	33.3
	1	1	30	66.7

**ACS37002LMA-050B5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-50	-	50	A
		Gain Sel 01	-40	-	40	A
		Gain Sel 10	-33.3	-	33.3	A
		Gain Sel 11	-66.7	-	66.7	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	40	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	50	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	60	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	30	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	2.5	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})) / (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}}) \times 100</math> AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-	$-2.7 \pm 0.8$	-	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-1 \pm 1.2$	-	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$-2.7 \pm 0.8$	-	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-4 \pm 6$	-	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 8$	-	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$\pm 7$	-	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 6$	-	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-5 \pm 7$	-	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 9$	-	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

ACS37002LMA-066B5 Gain\_Sel Pin Performance Key

ACS37002LMA-066B5 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	30	66.7
	0	1	25	80
	1	0	20	100
	1	1	15	133.3

**ACS37002LMA-066B5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-66.7	-	66.7	A
		Gain Sel 01	-80	-	80	A
		Gain Sel 10	-100	-	100	A
		Gain Sel 11	-133.3	-	133.3	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	30	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	25	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	20	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	15	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$	-	2.5	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})) / (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}}) \times 100</math>) AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-	$-2.7 \pm 0.8$	-	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-1 \pm 1.2$	-	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$-2.7 \pm 0.8$	-	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-4 \pm 6$	-	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 8$	-	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$\pm 7$	-	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 6$	-	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-5 \pm 7$	-	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 9$	-	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

ACS37002LMA-050U5 Gain\_Sel Pin Performance Key

ACS37002LMA-050U5 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	80	50
	0	1	100	40
	1	0	120	33.3
	1	1	60	66.7

**ACS37002LMA-050U5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	0	–	50	A
		Gain Sel 01	0	–	40	A
		Gain Sel 10	0	–	33.3	A
		Gain Sel 11	0	–	66.7	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	80	–	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	100	–	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	120	–	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	60	–	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	25	50	100	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Unidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	–	0.5	–	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}}) \times 100</math> AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–	$-2.7 \pm 0.8$	–	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-1 \pm 1.2$	–	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$-2.7 \pm 0.8$	–	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-4 \pm 6$	–	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 8$	–	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$\pm 7$	–	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 6$	–	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-5 \pm 7$	–	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 9$	–	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

ACS37002LMA-066U5 Gain\_Sel Pin Performance Key

ACS37002LMA-066U5 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	60	66.7
	0	1	50	80
	1	0	40	100
	1	1	30	133.3

**ACS37002LMA-066U5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	0	–	66.7	A
		Gain Sel 01	0	–	80	A
		Gain Sel 10	0	–	100	A
		Gain Sel 11	0	–	133.3	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	60	–	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	50	–	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	40	–	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	30	–	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	25	50	100	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Unidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	–	0.5	–	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}}) \times 100</math> AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–	$-2.7 \pm 0.8$	–	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-1 \pm 1.2$	–	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$-2.7 \pm 0.8$	–	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-4 \pm 6$	–	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 8$	–	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$\pm 7$	–	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 6$	–	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-5 \pm 7$	–	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 9$	–	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

ACS37002LMA-050B3 Gain\_Sel Pin Performance Key

ACS37002LMA-050B3 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	26.4	50
	0	1	33	40
	1	0	39.6	33.3
	1	1	19.8	66.7

**ACS37002LMA-050B3 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-50	-	50	A
		Gain Sel 01	-40	-	40	A
		Gain Sel 10	-33.3	-	33.3	A
		Gain Sel 11	-66.7	-	66.7	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	26.4	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	33	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	39.6	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	19.8	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT}(Q)}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	1.65	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT}(\text{ACTUAL})} - (\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}}</math>) × 100 AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	±1.4	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	±1.3	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	±1.2	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	±4	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	±5	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT}(Q)} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	±4	8	mV
		$V_{\text{IOUT}(Q)} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	±5	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT}(Q)}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	±6	10	mV
		$V_{\text{IOUT}(Q)}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	±7	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-	-2.7 ±0.8	-	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	-1 ±1.2	-	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	-2.7 ±0.8	-	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	-4 ±6	-	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	±8	-	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT}(Q)} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	±7	-	mV
		$V_{\text{IOUT}(Q)} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	±6	-	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT}(Q)}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	-5 ±7	-	mV
		$V_{\text{IOUT}(Q)}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	±9	-	mV

[1] Typicals are based on worse case mean ±3 sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

ACS37002LMA-066B3 Gain\_Sel Pin Performance Key

ACS37002LMA-066B3 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	19.8	66.7
	0	1	16.5	80
	1	0	13.2	100
	1	1	9.9	133.3

**ACS37002LMA-066B3 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-66.7	-	66.7	A
		Gain Sel 01	-80	-	80	A
		Gain Sel 10	-100	-	100	A
		Gain Sel 11	-133.3	-	133.3	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	19.8	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	16.5	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	13.2	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	9.9	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	1.65	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} \times 100</math>) AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-	$-2.7 \pm 0.8$	-	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-1 \pm 1.2$	-	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$-2.7 \pm 0.8$	-	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-4 \pm 6$	-	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 8$	-	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$\pm 7$	-	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 6$	-	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-	$-5 \pm 7$	-	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 9$	-	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

ACS37002LMA-050U3 Gain\_Sel Pin Performance Key

ACS37002LMA-050U3 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	52.8	50
	0	1	66	40
	1	0	79.2	33.3
	1	1	39.6	66.7

**ACS37002LMA-050U3 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	0	–	50	A
		Gain Sel 01	0	–	40	A
		Gain Sel 10	0	–	33.3	A
		Gain Sel 11	0	–	66.7	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	52.8	–	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	66	–	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	79.2	–	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	39.6	–	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	25	50	100	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Unidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	–	0.33	–	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} \times 100</math>) AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–	$-2.7 \pm 0.8$	–	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-1 \pm 1.2$	–	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$-2.7 \pm 0.8$	–	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-4 \pm 6$	–	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 8$	–	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$\pm 7$	–	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 6$	–	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-5 \pm 7$	–	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 9$	–	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.



### ACS37002LMA-066U3 Gain\_Sel Pin Performance Key

				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	39.6	66.7
	0	1	33	80
	1	0	26.4	100
	1	1	19.8	133.3

**ACS37002LMA-066U3 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	0	–	66.7	A
		Gain Sel 01	0	–	80	A
		Gain Sel 10	0	–	100	A
		Gain Sel 11	0	–	133.3	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	39.6	–	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	33	–	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	26.4	–	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	19.8	–	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	25	50	100	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Unidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	–	0.33	–	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})) / (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}}) \times 100</math> AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–	$-2.7 \pm 0.8$	–	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-1 \pm 1.2$	–	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$-2.7 \pm 0.8$	–	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-4 \pm 6$	–	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 8$	–	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$\pm 7$	–	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 6$	–	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–	$-5 \pm 7$	–	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–	$\pm 9$	–	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

### ACS37002KMA-050B5 Gain\_Sel Pin Performance Key

ACS37002KMA-050B5 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	40	50
	0	1	50	40
	1	0	60	33.3
	1	1	30	66.7

**ACS37002KMA-050B5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. <sup>[1]</sup>	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-50	-	50	A
		Gain Sel 01	-40	-	40	A
		Gain Sel 10	-33.3	-	33.3	A
		Gain Sel 11	-66.7	-	66.7	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	40	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	50	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	60	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	30	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	2.5	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}}</math>) × 100 AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	±0.9	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-1	±0.8	1	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1	±0.75	1	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-10	±4	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	±5	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-8	±4	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	±5	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-10	±6	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	±7	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT<sup>[2]</sup></b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-	-2.7 ±0.8	-	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	-1 ±1.2	-	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	-2.7 ±0.8	-	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	-4 ±6	-	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	±8	-	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	±7	-	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	±6	-	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	-5 ±7	-	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	±9	-	mV

<sup>[1]</sup> Typicals are based on worse case mean ±3 sigma values during production or production and qualification.

<sup>[2]</sup> Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

### ACS37002KMA-050B3 Gain\_Sel Pin Performance Key

ACS37002KMA-050B3 Gain_Sel Pin Performance Key				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	26.4	50
	0	1	33	40
	1	0	39.6	33.3
	1	1	19.8	66.7

### ACS37002KMA-050B3 PERFORMANCE CHARACTERISTICS: Valid through full operating temperature range, $T_A = -40^\circ\text{C}$ to $125^\circ\text{C}$ , $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-50	-	50	A
		Gain Sel 01	-40	-	40	A
		Gain Sel 10	-33.3	-	33.3	A
		Gain Sel 11	-66.7	-	66.7	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	26.4	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	33	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	39.6	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	19.8	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	1.65	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})) / (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}}) \times 100</math> AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	$\pm 0.9$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-1	$\pm 0.8$	1	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1	$\pm 0.75$	1	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 7$	10	mV
<b>TOTAL ERROR AND TOTAL ERROR COMPONENTS INCLUDING LIFETIME DRIFT [2]</b>						
Total Error Including Lifetime Drift	$E_{\text{TOT\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-	$-2.7 \pm 0.8$	-	%
Sensitivity Error Including Lifetime Drift	$E_{\text{SENS\_LTD}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	$-1 \pm 1.2$	-	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$-2.7 \pm 0.8$	-	%
Zero Current Reference Error Including Lifetime Drift	$V_{\text{RE\_LTD}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	$-4 \pm 6$	-	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 8$	-	mV
Offset Error Including Lifetime Drift	$V_{\text{OE\_LTD}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	$\pm 7$	-	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 6$	-	mV
QVO Error Including Lifetime Drift	$V_{\text{QE\_LTD}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $125^\circ\text{C}$	-	$-5 \pm 7$	-	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-	$\pm 9$	-	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

[2] Lifetime drift characteristics are based on the commercial qualification results from zero hours reads. Cannot be guaranteed. Drift is a function of customer application conditions. Contact Allegro MicroSystems for further information.

### ACS37002LLA-015B5 Gain\_Sel Pin Performance Key

				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	133.3	15
	0	1	166.6	12
	1	0	200	10
	1	1	100	20

**ACS37002LLA-015B5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-15	-	15	A
		Gain Sel 01	-12	-	12	A
		Gain Sel 10	-10	-	10	A
		Gain Sel 11	-20	-	20	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	133.3	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	166.6	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	200	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	100	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$	-	2.5	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}}) / (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}}) \times 100</math>) AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 7$	10	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

ACS37002LLA-025B5 Gain\_Sel Pin Performance Key

				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	80	25
	0	1	66.6	30
	1	0	53.3	37.5
	1	1	40	50

**ACS37002LLA-025B5 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 5 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-25	-	25	A
		Gain Sel 01	-30	-	30	A
		Gain Sel 10	-37.5	-	37.5	A
		Gain Sel 11	-50	-	50	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	80	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	66.6	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	53.3	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	40	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	2.5	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{\text{IDEAL}} \times I_{\text{PR}} \times 100</math>) AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	$\pm 1.4$	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	$\pm 1.3$	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	$\pm 1.2$	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 4$	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 5$	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	$\pm 4$	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	$\pm 5$	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	$\pm 6$	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	$\pm 7$	10	mV

[1] Typicals are based on worse case mean  $\pm 3$  sigma values during production or production and qualification.

# ACS37002

## 400 kHz, High Accuracy Current Sensor with Pin-Selectable Gains and Adjustable Overcurrent Fast Fault in SOICW-16 Package

ACS37002LLA-015B3 Gain\_Sel Pin Performance Key

				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	88	15
	0	1	110	12
	1	0	132	10
	1	1	66	20

**ACS37002LLA-015B3 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	-15	-	15	A
		Gain Sel 01	-12	-	12	A
		Gain Sel 10	-10	-	10	A
		Gain Sel 11	-20	-	20	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	88	-	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	110	-	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	132	-	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	-	66	-	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	50	100	200	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Bidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	-	1.65	-	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}}</math>) × 100 AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	-1.75	±1.4	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-1.5	±1.3	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-1.5	±1.2	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	±4	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	±5	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-8	±4	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-8	±5	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	-10	±6	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	-10	±7	10	mV

[1] Typicals are based on worse case mean ±3 sigma values during production or production and qualification.

**ACS37002LLA-025U3** Gain\_Sel Pin Performance Key

				Selection Identifier
Parameter (Units)	Gain_Sel_1 (Boolean)	Gain_Sel_0 (Boolean)	Gain (mV/A)	Max IP (A)
Type	Digital Input	Digital Input	Calculation	Bidirectional
Selection Combination	0	0	105.6	25
	0	1	88	30
	1	0	70.4	37.5
	1	1	52.8	50

**ACS37002LLA-025U3 PERFORMANCE CHARACTERISTICS:** Valid through full operating temperature range,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $C_{\text{BYPASS}} = 0.1 \mu\text{F}$ , and  $V_{\text{CC}} = 3.3 \text{ V}$ , unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [1]	Max.	Units
<b>NOMINAL PERFORMANCE</b>						
Current Sensing Range	$I_{\text{PR}}$	Gain Sel 00	0	–	25	A
		Gain Sel 01	0	–	30	A
		Gain Sel 10	0	–	37.5	A
		Gain Sel 11	0	–	50	A
Sensitivity	Sens	Gain Sel 00; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	105.6	–	mV/A
		Gain Sel 01; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	88	–	mV/A
		Gain Sel 10; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	70.4	–	mV/A
		Gain Sel 11; $I_{\text{PR}(\text{min})} < I_{\text{P}} < I_{\text{PR}(\text{max})}$	–	52.8	–	mV/A
Overcurrent Fault Operating Range	$I_{\text{OCF-OR}}$	Typ. = factory-programmed default, FS = Full-Scale	25	50	100	%FS
Zero Current Output Voltage	$V_{\text{IOUT(Q)}}$	Unidirectional; $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$	–	0.33	–	V
<b>TOTAL ERROR (<math>V_{\text{IOUT(ACTUAL)}} - (\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}} + V_{\text{REF}})</math>) / (<math>\text{Sens}_{(\text{IDEAL})} \times I_{\text{PR}}</math>) × 100</b> <b>AND TOTAL ERROR COMPONENTS</b>						
Total Error	$E_{\text{TOT}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$	–1.75	±1.4	1.75	%
Sensitivity Error	$E_{\text{SENS}}$	$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–1.5	±1.3	1.5	%
		$I_{\text{P}} = I_{\text{PR}(\text{max})}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–1.5	±1.2	1.5	%
Zero Current Reference Error	$V_{\text{RE}}$	$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	±4	10	mV
		$V_{\text{REFactual}} - V_{\text{REFideal}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	±5	10	mV
Offset Error	$V_{\text{OE}}$	$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–8	±4	8	mV
		$V_{\text{IOUT(Q)}} - V_{\text{REF}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–8	±5	8	mV
QVO Error	$V_{\text{QE}}$	$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = 25^\circ\text{C}$ to $150^\circ\text{C}$	–10	±6	10	mV
		$V_{\text{IOUT(Q)}}$ , $I_{\text{P}} = 0 \text{ A}$ , $T_A = -40^\circ\text{C}$ to $25^\circ\text{C}$	–10	±7	10	mV

[1] Typicals are based on worse case mean ±3 sigma values during production or production and qualification.

## FUNCTIONAL DESCRIPTION

### Power-On Reset Operation

#### POWER-ON

As  $V_{CC}$  ramps up, the ACS37002  $V_{IOUT}$  and  $V_{REF}$  pins are high impedance until  $V_{CC}$  reaches and passes  $V_{UVD(H)}$  [2] (or  $V_{POR(H)}$  [1] if UVD is disabled). Once  $V_{CC}$  passes [2], the device takes some time without  $V_{CC}$  dropping below  $V_{POR(L)}$  [8] before the device enters normal operation.

#### POWER-OFF

As  $V_{CC}$  drops below  $V_{POR(L)}$  [8], the outputs will enter a high-impedance state. If UVD is enabled, before the device powers off, it will force  $V_{IOUT}$  to GND if  $V_{CC} < V_{UVD(L)}$  [6] until  $V_{POR(L)}$  [8] (seen in Figure 4 and Figure 6) is reached, at which point  $V_{IOUT}$  and  $V_{REF}$  will go high Z. If UVD is disabled, then  $V_{REF}$  and  $V_{IOUT}$  will continue to report until  $V_{CC}$  is less than  $V_{POR(L)}$  [8] (seen in Figure 7), at which point they will go high Z.

Note: Since the device is entering a high Z state, and not forcing the output, the time it takes the output to settle will depend on the external circuitry used.

#### POWER-ON TIMING

The descriptions in this section assume: temperature = 25°C, with the labeled test conditions. The provided graphs in this section show  $V_{IOUT}$  moving with  $V_{CC}$ . The voltage of  $V_{IOUT}$  during a high-impedance state will be most consistent with a known load ( $R_{LOAD}, C_{LOAD}$ ).

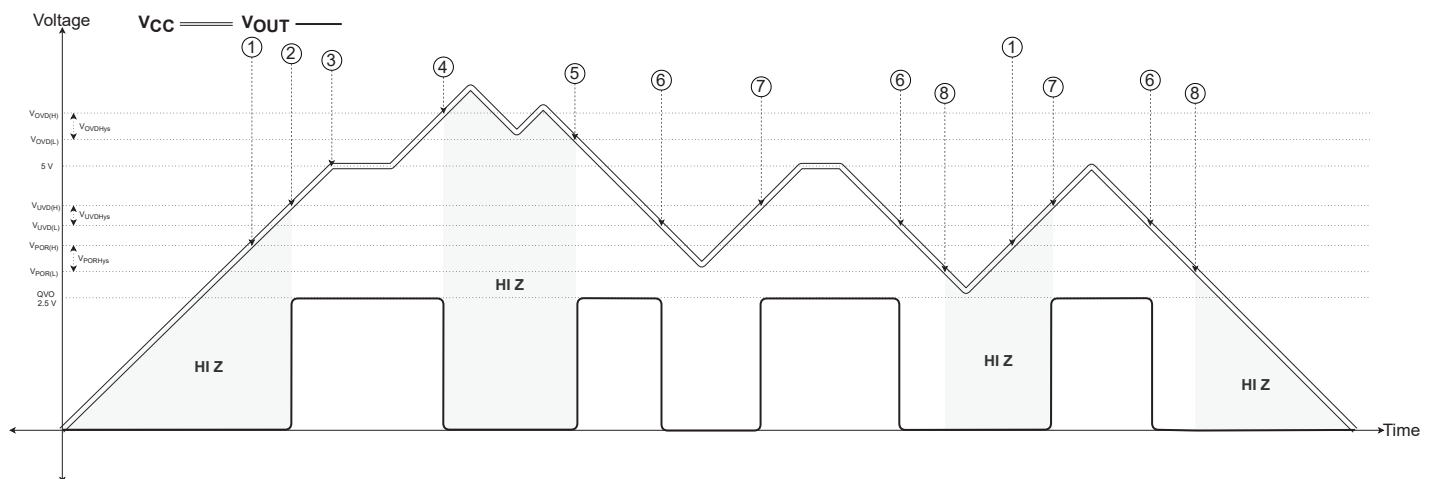


Figure 4: Power States Thresholds with  $V_{IOUT}$  Behavior for a 5 V Device,  $R_L =$  Pull-Down, UVD Enabled

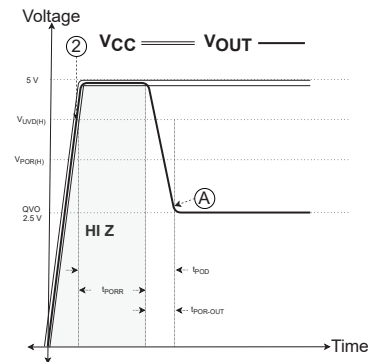


Figure 5:  $t_{POD}$  behavior UVD disabled,  $R_L =$  Pull-Up

#### POWER-ON RESET (POR)

If  $V_{CC}$  falls below  $V_{POR(L)}$  [8] while in operation, the output will re-enter a high-impedance state. After  $V_{CC}$  recovers and exceeds  $V_{UVD(H)}$  [2], the output will begin reporting again after the delay of  $t_{POD}$ .

#### POWER-ON DELAY ( $T_{POD}$ )

When the supply is ramped to  $V_{UVD(H)}$  (seen in Figure 5 as [2]), the device will require a finite time to power its internal components before the outputs are released from high Z and can respond to an input magnetic field. Power-On Time,  $t_{POD}$ , 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, which can be seen the time from [2] to [A]. After this delay, the output will quickly approach  $V_{IOUT(Gauss)} = \text{Sens} \times \text{Amps} + V_{REF}$ .



### Overvoltage and Undervoltage Detection

To ensure that the device's output can be trusted, the device contains an overvoltage and an undervoltage detection flag. This will use  $V_{IOUT}$  to alert the system when the supply voltage is outside of the operational ranges.

#### UNDERVOLTAGE DETECTION VOLTAGE THRESHOLDS ( $V_{UVD(H/L)}$ )

The ACS37002 comes factory-programmed with UVD enabled. It is important to note that when powering up the device for the first time after a POR event,  $V_{IOUT}$  and  $V_{REF}$  will remain high Z until  $V_{CC}$  is raised above  $V_{UVD(H)}$  (seen in Figure 6 as [2]), at which point the  $V_{IOUT}$  and  $V_{REF}$  pins will begin to operate. If UVD is disabled or it is a 3.3 V device,  $V_{IOUT}$  and  $V_{REF}$  will begin report after  $V_{CC}$  raises above  $V_{POR(H)}$  (seen in Figure 7 as [1]) under the

same conditions.

If  $V_{CC}$  drops below  $V_{UVD(L)}$  [6] after normal operation,  $V_{IOUT}$  will go to GND regardless of  $R_{LOAD}$  configuration. The  $V_{IOUT}$  pin will stay at GND until  $V_{CC}$  raises above  $V_{UVD(H)}$  [7] or  $V_{CC}$  falls below  $V_{POR(L)}$  [8]. If  $V_{CC}$  rises above  $V_{UVD(H)}$  [7] after a UVD event, the outputs will resume operation. If  $V_{CC}$  drops below  $V_{POR(L)}$  [8], the device will enter a POR event and reset;  $V_{IOUT}$  and  $V_{REF}$  will switch to high Z if this occurs.

#### OVERVOLTAGE DETECTION VOLTAGE THRESHOLDS ( $V_{OVD(H/L)}$ )

When  $V_{CC}$  raises above  $V_{OVD(H)}$  (seen in Figure 6 as [4]), the output of the  $V_{REF}$  and  $V_{IOUT}$  pin will go high Z,  $V_{REF}$  be pulled to GND, and  $V_{IOUT}$  will be pulled to either VCC or GND, depending if  $R_{Load}$  is in a pull-up or pull-down configuration.

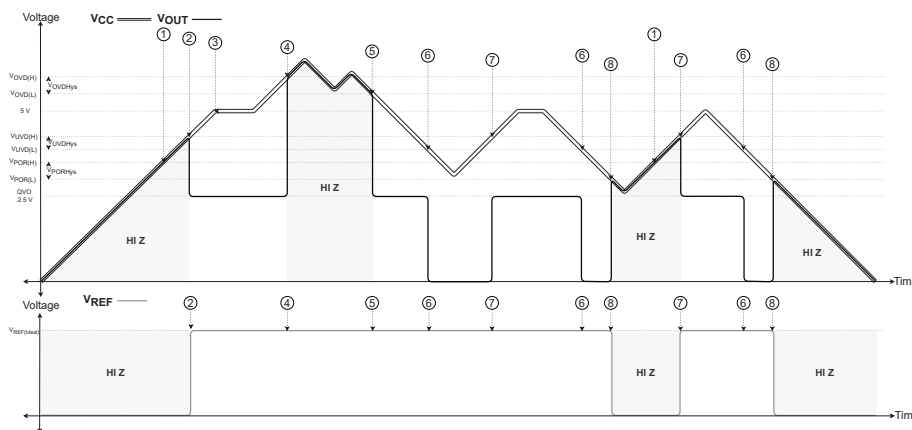


Figure 6: Power States Thresholds with  $V_{IOUT}$  and  $V_{REF}$  Behavior, 5 V Device,  $R_L$  = Pull-Up, UVD Enabled

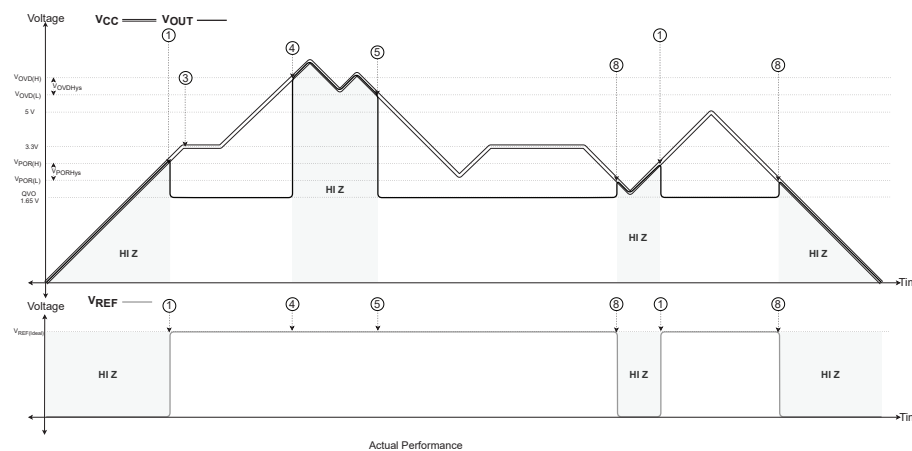


Figure 7: Power States Thresholds with  $V_{IOUT}$  and  $V_{REF}$  Behavior, 3.3 V Device,  $R_L$  = Pull-Up, UVD Disabled

### OVERVOLTAGE/UNDERVOLTAGE DETECTION HYSTERESIS ( $V_{OVDHYS}$ , $V_{UVDHYS}$ )

To prevent toggling, there is hysteresis between enable and disable thresholds to reducing nuisance flagging and clears. There is about 1 V and 0.4 V of hysteresis for Overvoltage and Undervoltage respectively. These can be seen represented in Figure 6 between the relevant thresholds.

### OVERVOLTAGE AND UNDERVOLTAGE ENABLE AND DISABLE TIME ( $T_{OVD(E/D)}$ , $T_{UVD(E/D)}$ )

The enable time for OVD,  $t_{OVD(E)}$ , is the time from  $V_{OVD(H)}$  [4] to OVD flag [B] in Figure 8. The UVD enable time,  $t_{UVD(E)}$ , is the time from  $V_{UVD(L)}$  [6] to the UVD flag [D], also in Figure 8. The enable flag for both OVD and UVD has a counter to reduce transients faster than 64  $\mu$ s from triggering nuisance flags.

If  $V_{CC}$  ramps from  $>V_{UVD(L)}$  [6] to  $<V_{POR(L)}$  [8] (both seen in Figure 8) faster than  $t_{UVD(E)}$ , then the device will not have time to report a UVD event before power off occurs.

The disable time for OVD,  $t_{OVD(D)}$ , is the time from  $V_{OVD(L)}$  [5] to the OVD clear to normal operation [C] in Figure 8. The UVD disable time,  $t_{UVD(D)}$ , is the time from  $V_{UVD(H)}$  [7] to the UVD flag clear to nominal operation [E], also seen in Figure 8. The disable time does not have a counter for either UVD or OVD to release the output and resume reporting as soon as possible.

### SUPPLY ZENER CLAMP VOLTAGES

If the voltage applied to the device continues to increase past overvoltage detection to extreme levels, there is a point when the Zener diodes will turn on ( $V_Z$ ). These internal diodes are in place to protect the device from short high voltage or ESD events and should NOT be used as a feature to reduce the voltage on a line.

Continued exposure to voltages higher than normal operating voltage  $V_{CC(ypical)}$  can weaken or even damage the Zener diodes and potentially lead to damage of the part.

### Absolute Maximum Ratings

These are the maximum application or environmental conditions that the device can be subjected before damage may occur.

### FORWARD AND REVERSE SUPPLY VOLTAGE

This is the greatest voltage that can be supplied to  $V_{CC}$  from GND during programming or transient switching. This voltage should not be used as a DC voltage bias for an extended time.

### FORWARD AND REVERSE OUTPUT VOLTAGE

The forward Output Voltage or  $V_{FOUT}$  rating should be read as a voltage of no greater than  $V_{CC} + 0.5$  up to 6.5 V. This is the greatest voltage that the output can be biased with from GND during programming or transient switching. The Reverse Output Voltage or  $V_{ROUT}$  should not drop below  $-0.5$  V during programming or transient switching. These voltages should not be used as a DC voltage bias for an extended time.

### FORWARD AND REVERSE REFERENCE/FAULT VOLTAGE

The Forward Reference/Fault Voltage or  $V_{F-RF}$  rating should be read as a voltage of no greater than  $V_{CC} + 0.5$  up to 6.5 V. This is the greatest voltage that the output can be biased with from GND during programming or transient switching. The Reverse Output Voltage or  $V_{R-RF}$  should not drop below  $-0.5$  V during programming or transient switching. These voltages should not be used as a DC voltage bias for an extended time.

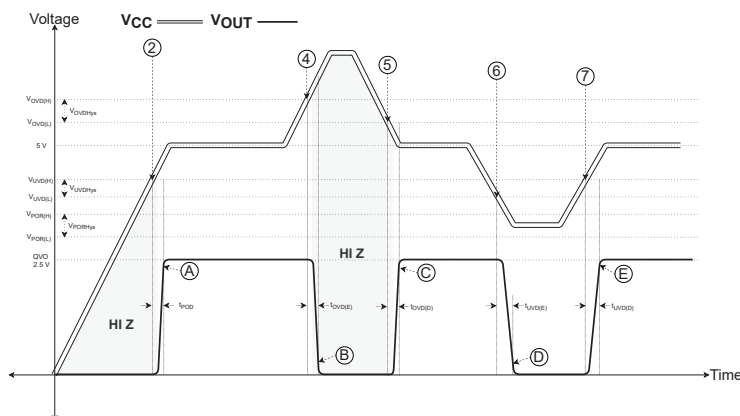


Figure 8:  $t_{POD}$ ,  $t_{OVD(E/D)}$ , and  $t_{UVD(E/D)}$  with  $R_L = \text{Pull-Up}$

## DEFINITIONS OF OPERATING AND PERFORMANCE CHARACTERISTICS

### OUTPUT SOURCE AND SINK CURRENT

This is the maximum current that  $V_{IOUT}$  can passively sink or source before damage may occur.

### Zero Current Voltage Output ( $V_{IOUT(Q)}$ , QVO)

Zero Current Voltage Output or  $V_{IOUT(Q)}$  (also called QVO) is defined as the voltage on the output  $V_{IOUT}$  when zero amps are applied.

### QVO Temperature Drift ( $V_{QE}$ )

QVO Temperature Drift or  $V_{QE}$  is defined as the drift of QVO from room to hot or room to cold (25°C to 125/150°C or 25°C to -40°C respectively). Temperature drift is compensated with Allegro's factory trim to remain within the limits across temperature.

### Reference Voltage ( $V_{REF}$ )

There is a voltage reference output pin (VREF) on the ACS37002. This allows the user to know the zero-current voltage for the output channel  $V_{IOUT}$ . This allows for differential measurement and allows for device referred supply for the VOC pin.

### Reference Voltage Temperature Drift ( $V_{RE}$ )

Reference Voltage Temperature Drift or  $V_{RE}$  is defined as the drift of  $V_{REF}$  from room to hot or room to cold (25°C to 125/150°C or 25°C to -40°C respectively).

### Offset Voltage ( $V_{OE}$ )

Offset Voltage or  $V_{OE}$  is defined as  $QVO - V_{REF}$  and is demonstrated in Figure 9. This includes the drift of  $QVO - V_{REF}$  from room to hot or room to cold (25°C to 125/150°C or 25°C to

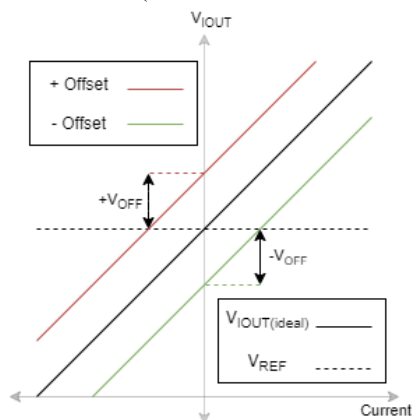


Figure 9: Offset ( $V_{OFF}$ ) Between  $V_{IOUT}$  and  $V_{REF}$

-40°C respectively).

### Output Saturation Voltage ( $V_{SAT(HIGH/LOW)}$ )

Output Saturation Voltage or  $V_{SAT}$  is defined as the voltage that output no longer changes when the magnitude of the magnetic field is increased.  $V_{SAT(HIGH)}$  is the highest voltage the output can drive to while,  $V_{SAT(LOW)}$  is the lowest. This can be seen in Figure 10. Note that changing the sensitivity does not change the  $V_{SAT}$  points.

### OUTPUT VOLTAGE OPERATING RANGE ( $V_{OOR}$ )

The Output Voltage Operating Range or  $V_{OOR}$  is the functional range for linear performance of  $V_{IOUT}$  and its related datasheet parameters. This can be seen in Figure 10. The output is centered at QVO and will remain within datasheet limits across the  $V_{OOR}$ . It is possible for the output to report beyond these voltages until  $V_{SAT}$ , but certain parameters may not meet datasheet limits. The output performance is demonstrated in Figure 9 through and beyond the  $V_{OOR}$ .

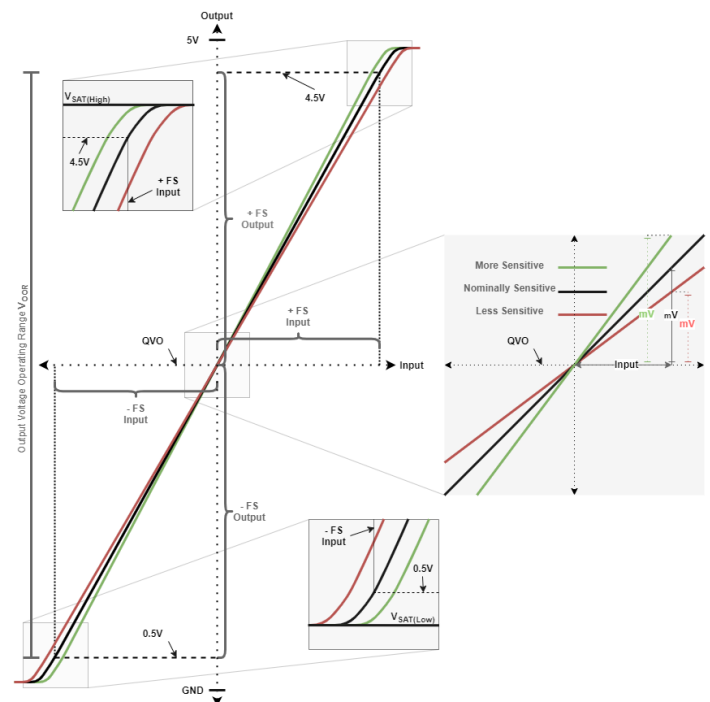


Figure 10:  $V_{OOR}$ ,  $V_{SAT}$  and SENS with Full Scale

## Sensitivity (Sens)

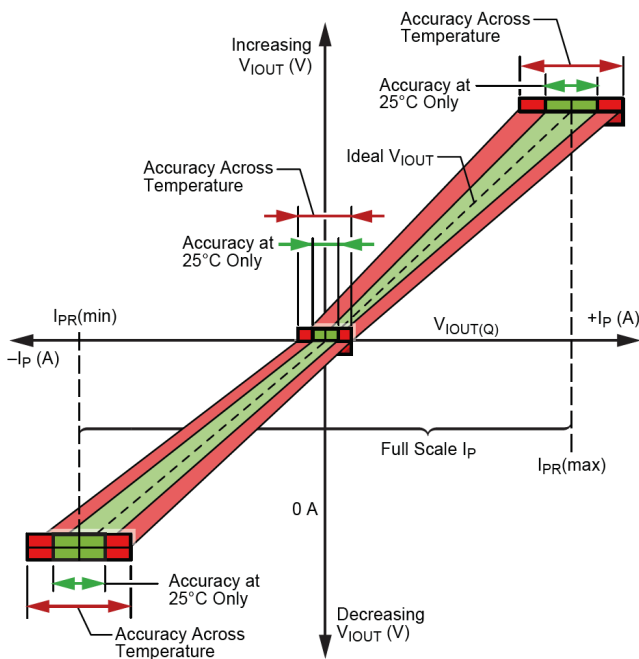
The definition of Sensitivity or Sens is the ratio of the output swing versus current through the IP pins. This current moves the output voltage away from its QVO and towards the supply voltage rails. The magnitude and direction of the output voltage swing is proportional by Sens to the magnitude and direction of the applied current.

$$Sens = \frac{V_{OUT(I1)} - V_{OUT(I2)}}{I_1 - I_2}$$

where  $I_1$  and  $I_2$  are two different currents, and where  $V_{IOUT(I1)}$  and  $V_{IOUT(I2)}$  are the voltages of the device with the applied currents.  $V_{IOUT}$ ,  $I_1$ , or  $I_2$  can be QVO with zero current.

## Sensitivity Error ( $E_{sens}$ )

Sensitivity Temperature Drift or  $E_{sens}$  is defined as the drift of Sens from room to hot or room to cold (25°C to 125°C or 25°C to -40°C respectively). No trimming/programming is needed because temperature drift is compensated with Allegro's factory trim to remain within the datasheet limits across temperature.



**Figure 11: Output Accuracy Pocket for Room and Across Temperature**

## Gain Selection Pins

The ACS37002 features external gain selection pins that configure the device sensitivity. The gain select logic is latched based on the pin voltage at startup. Either pin may be shorted directly to VCC or GND (logic 1 or 0). Both pins include an internal 1 MΩ pull-down to GND. Floating pins will be interpreted as logic 0; if both pins are floating, the device will be in the 00 configuration. Specific gain select performance can be found in the selection performance characteristics table. To change the gain of the device, refer to Figure 22 in the application and theory section.

## Full Scale (FS)

Full Scale or FS is defined as the range that relates the devices actual sensitivity,  $V_{OOR}$  and  $V_{REF}$ . This value is used for reference of the devices functional operation range and when discussing a fault trip level.  $FS_{INPUT}$  is the input bias that results in  $FS_{OUTPUT}$  and these two are directly related by the device actual sensitivity. Both FS can be seen in Figure 10, labeled as positive or negative FS input and FS output. The equation for input referred FS for a 5 V bidirectional device is:

$$FS = \pm 2 V/Sens_{Actual}$$

Note that a percentage change in  $FS_{INPUT}$  is equivalent to resultant percentage change of  $FS_{OUTPUT}$  and visa versa.

## Nonlinearity ( $E_{LIN}$ )

As the amount of field applied to the part changes the sensitivity of the device can also change slightly. This is referred to as linearity error or  $E_{LIN}$  and an exaggerated example can be seen in Figure 12. Consider two currents,  $I_1$  (1/2 FS) and  $I_2$  (FS). Ideally, the sensitivity of the device is the same for both fields everything else equal. Linearity Error is calculated as the percent change in sensitivity from one field to another. Error is calculated separately for positive ( $E_{LIN(+)}$ ) and negative ( $E_{LIN(-)}$ ) currents, and the percent errors are defined as:

$$E_{LIN(\pm)} = \left( 1 - \frac{Sens_{I2\pm}}{Sens_{I1\pm}} \right) * 100\%$$

where:

$$Sens_{IX+} = (V_{IOUTIX+} - V_{REF}) / I_{X+}$$

and

$$Sens_{IX-} = (V_{IOUTIX-} - V_{REF}) / I_{X-}$$

$I_x$  are positive and negative currents through  $I_P$ , such that  $|I_{x2}| = 2 \times |I_{x1}|$  and  $|I_{x2}| = 2 \times |I_{x1}|$ .  $E_{LIN} = \max(E_{LIN(+)}, E_{LIN(-)})$

### Total Output Error ( $E_{TOT}$ )

The difference between the current measurement from the sensor IC and the actual current  $I$ , 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 field applied to the device:

$$E_{TOT(\pm)} = \left( 1 - \frac{V_{IOUT\_Actual(\pm I)}}{V_{IOUT\_Ideal(\pm I)}} \right) * 100\%$$

where

$$V_{IOUT\_Actual(\pm I)} = \pm I \times Sens_{Actual} + QVO_{Actual}$$

and

$$V_{IOUT\_Ideal(\pm I)} = \pm I \times Sens_{Ideal} + V_{REF\_Actual}$$

Total Output Error incorporates all sources of error and is a function of current. At relatively high currents, Total Output Error will be mostly due to sensitivity error, and at relatively low fields, Total Output Error will be mostly due to Offset Voltage ( $V_{OE}$ ). In fact, at  $I = 0$ , Total Output Error approaches infinity due to the offset. An example of total error at FS can be seen in Figure 12.

Note: Total Output Error goes to infinity as the amount of applied field approaches 0 A.

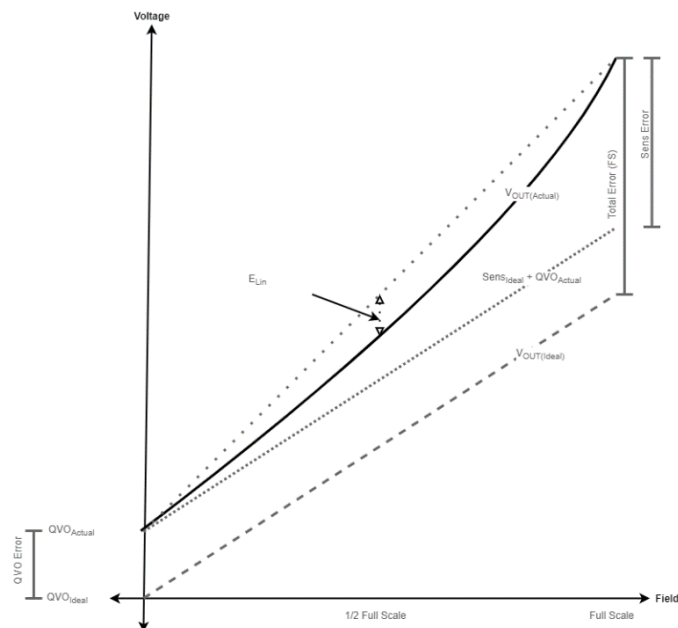


Figure 12: Accuracy Error

### Power Supply Offset Error ( $V_{PS}$ )

Power Supply Offset Error or  $V_{PS}$  is defined as the offset error in mV between  $V_{CC}$  and  $V_{CC} \pm 10\% V_{CC}$ . For a 5 V device, this is 5 to 4.5 V and 5 to 5.5 V. For a 3.3 V device, this is 3.3 to 3 V and 3.3 to 3.6 V.

### Offset Power Supply Rejection Ratio (PSRRO)

The Offset Power Supply Rejection Ratio or PSRRO is defined as  $20 \times \log$  of the ratio of the change of QVO in volts over a  $\pm 100$  mV variable AC  $V_{CC}$  centered at 5 V reported as dB in a specified frequency range. This is an AC version of the  $V_{PS}$  parameter. The equation is shown below:

$$PSRRO = 20 \log \left( \frac{\Delta QVO}{\Delta V_{CC}} \right)$$

### Power Supply Sensitivity Error ( $E_{PS}$ )

Power Supply Sensitivity Error or  $E_{PS}$  is defined as the % sensitivity error measured between  $V_{CC}$  and  $V_{CC} \pm 10\%$ . For a 5 V device, this is 5 to 4.5 V and 5 to 5.5 V. For a 3.3 V device, this is 3.3 to 3 V and 3.3 to 3.6 V.

### Sensitivity Power Supply Rejection Ratio (PSRRS)

The Sensitivity Power Supply Rejection Ratio or PSRRS is defined as  $20 \times \log$  of the ratio of the % change the sensitivity over the % change in  $V_{CC}$  ( $\pm 100$  mV variable AC  $V_{CC}$  centered at 5 V) reported as dB in a specified frequency range. This is the AC version of the  $E_{PS}$  parameter. The equation is shown below:

$$PSRRS = 20 \log \left( \frac{\Delta \% SENS}{\Delta \% V_{CC}} \right)$$

## FAULT BEHAVIOR

### Overcurrent Fault (OCF)

As the output swings because of a sensed current, the Overcurrent Fault pin will trigger with an active low flag if the sensed current exceeds its comparator threshold. This is internally compared with either the factory-programmed thresholds or via the VOC voltage when  $V_{VOC} > 0.1$  V. This flag trips symmetrically for the positive and negative OCF operating point.

The implementation for the OCF circuitry is accurate over temperature and does not require further temperature compensation as it is dependent on the Sens and  $V_{OFF}$  parameters that are already factory-trimmed flat over temperature.

### OVERCURRENT FAULT OPERATING RANGE/POINT ( $I_{OCF-OR}$ , $I_{OCF-OP}$ )

Overcurrent Fault Operating Range is the functional range that the OCF thresholds can be set in terms of percentage of full-scale output swing. The Overcurrent Fault Operating Point is the specific point at which the OCF trigger will occur, and is set by either  $V_{VOC}$  or the factory default setting. The  $I_{OCF-OP}$  can be seen in Figure 13 as [9] along with the FAULT pin functionality.

### OVERCURRENT FAULT HYSTERESIS ( $I_{OCF-HYST}$ )

Overcurrent Fault Hysteresis or  $I_{OCF-HYST}$  is defined as the magnitude of current in percentage of the FS that must drop before a fault assertion will be cleared. This can be seen as the separation between the voltages [9] to [10] in Figure 15. Note the MASK and HOLD functionality are independent of each other. The ACS37002 comes standard with an  $OCF_{HYS}$  of 120 mV (on the output) or 6%FS for a 5 V device and 9%FS for a 3.3 V device. If a larger hysteresis is desired, ask an Allegro representative for options.

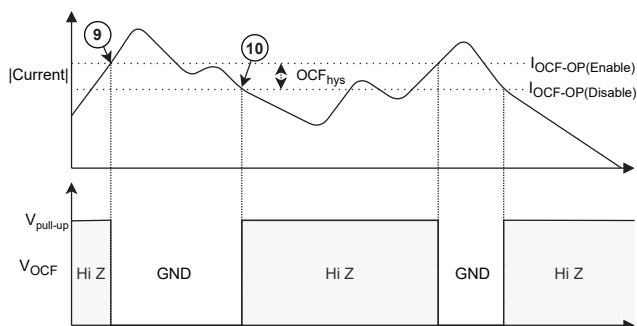


Figure 13: Fault Thresholds and OCF Pin Functionality

### VOLTAGE OVERCURRENT PIN (VOC)

The fault trip points can be set using the VOC pin as the direct analog input for the fault trip point. The VOC pin voltage can be set using resistor dividers from  $V_{REF}$  on bidirectional devices. The fault performance is valid when  $V_{VOC}$  is within the defined regions of 0.2 to 2 V and  $<0.2$  V. The device will respond to voltage outside of the defined valid performance region with varied results. For a 5 V bidirectional device, setting the VOC pin to 0.5 V selects the minimum trip point,  $I_{FAULT(min)}$ , and setting the pin to 2 V selects the maximum trip point,  $I_{FAULT(max)}$  as defined by selection performance tables. All voltages between 0.5 to 2 V for 5 V option and 0.33 to 1.321 V for 3.3 V option can linearly select a trip point between the minimum and maximum levels, as shown in Figure 14. When  $V_{OC} < 0.2$  V, the internal EEPROM fault level will be used.

The resulting equation for the fault is:

$$OCF_{\%FS} [\%] = \frac{V_{OC(VCC)} [V]}{V_{OC(VCC)100\%} [V]} \times 100 [\%]$$

$$I_{OCF} [A] = OCF_{\%FS} [\%] \times I_{PR} [A]$$

Table 1:  $V_{OC(VCC)}$  thresholds and corresponding percentage of the Full-Scale Output for Bidirectional and Unidirectional operational modes

$V_{OC(3.3V)}$ (V)	$V_{OC(5V)}$ (V)	Fault Operation Point %FS	
		Bidirectional	Unidirectional
<0.1		Factory Default (100%)	
0.330	0.5	50%	25%
0.466	0.75	75%	37.5%
0.661	1	100%	50%
0.826	1.25	125%	62.5%
0.991	1.5	150%	75%
1.156	1.75	175%	85%
1.321	2	200%	100%

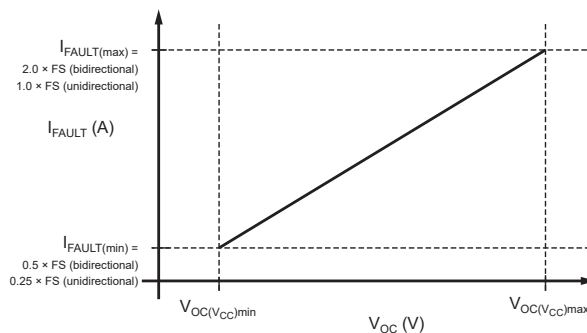


Figure 14: VOC Functional Range

## OVERCURRENT FAULT ERROR ( $E_{OCF}$ )

Fault Error or  $E_{OCF}$  is the error between the  $I_{OCF-OP(actual)}$  and  $I_{OCF-OP(ideal)}$ .

## OVERCURRENT FAULT RESPONSE TIME ( $T_{OCF}$ )

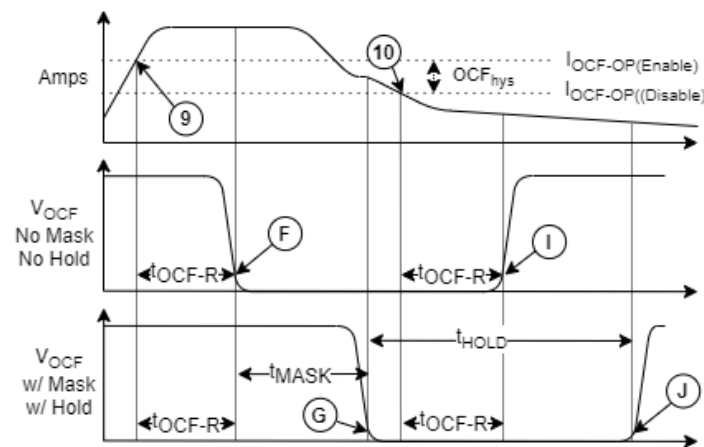
Overcurrent Response Time or  $t_{OCF}$  is defined as the time from the input reaches the operating point [9] (seen in Figure 15) until the devices FAULT pin falls below  $V_{FAULT-ON}$  [G]. If the OCF Mask is disabled, then  $t_{OCF}$  is equal to  $t_{OCF-R}$  seen as the time from [9] until [F].

## OVERCURRENT FAULT REACTION TIME ( $T_{OCF-R}$ )

Overcurrent Reaction Time or  $t_{OCF-R}$  is defined as the time from the current input rising above  $I_{OCF-OP}$  at point [9] in Figure 15 until the FAULT pin reaches  $V_{OCF-ON}$  at point [F] with the OCF mask disable. This is the time required for the device to recognize and clear the fault, seen as the time between [10] until [I].

## OVERCURRENT FAULT MASK TIME ( $T_{OCF-MASK}$ )

Overcurrent Fault Mask Time or  $t_{OCF-MASK}$  is defined as the additional amount of time the OCF must be present beyond the  $t_{OCF-R}$  time (seen in Figure 15 [F] until [G]). This is to reduce nuisance tripping of the FAULT pin. If an OCF occurs, but does not persist beyond  $t_{OCF-R} + t_{OCF-MASK}$ , it is not reported by the device (seen in Figure 16). This prevents short transient spikes from causing erroneous OCF flagging. Factory default setting is  $t_{OCF-MASK} = 0.5 \mu s$ . Ask an Allegro representative for further information.



**Figure 15: General Fault Timing.**  
Note: the MASK and HOLD functionality are independent of each other

## OVERCURRENT FAULT HOLD TIME ( $T_{OCF-HOLD}$ )

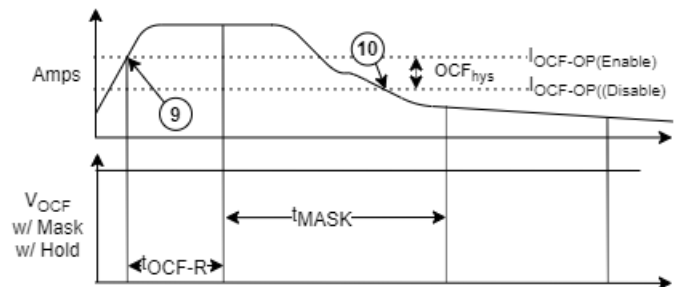
Overcurrent Fault Hold Time or  $t_{OCF-HOLD}$  is defined as the minimum time OCF flag will be asserted after a sufficient OCF event. After the hold time has been reached, the OCF will release if the OCF condition has ended (seen in Figure 15 [G] until [J]) or persist if the OCF condition is still present (seen in Figure 17 [G] until [J]). Factory default is 0 ms. Ask an Allegro representative for further information.

## OVERCURRENT FAULT PERSIST

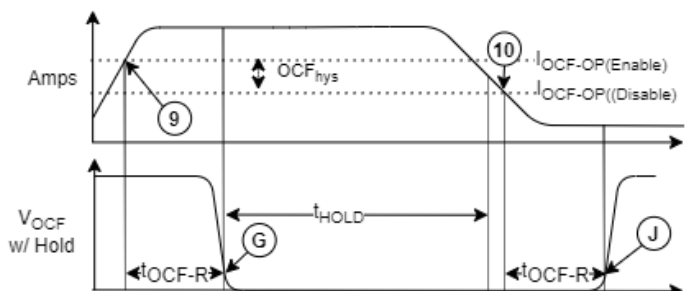
The ACS37002 has a fault persist option that will maintain the OCF flag if a flag occurred until a POR event. Ask an Allegro representative for further information.

## OCF DISABLE

The ACS37002 also contains the ability to disable overcurrent fault functionality. When this bit is set to 1, the FAULT pin will remain in high Z. Ask an Allegro representative for further information.



**Figure 16: Fault Condition Clearing Before Mask Time Is Reached**



**Figure 17: Fault Hold with Clear Fault After Hold Time**

**DYNAMIC RESPONSE PARAMETERS**

The descriptions in this section assume: temperature =25°C, and output loads are within specifications provided. The step applied is a input step that corresponds to 1 V excursion on the output, unless otherwise stated.

**Propagation Time ( $t_{pd}$ )**

The time interval between a) when the sensed field reaches 10% of its stable value, and b) when the sensor output reaches 10% of its stable value for a step input. See Figure 18.

**Rise Time ( $t_R$ )**

The time interval between a) when the sensor reaches 10% of its stable value, and b) when it reaches 90% of the stable value for a step input. See Figure 18.

**Response Time ( $t_{RESPONSE}$ )**

The time interval between a) when the sensed field reaches 90% of its stable value, and b) when the sensor output reaches 90% of its stable value. See Figure 18 for visual description of parameter.

**Overshoot**

The amount, in percent of step size, the output voltage ( $V_{IOUT}$ ) rises past the steady state output voltage. The equation used to calculate this is shown below, see Figure 19 for description of parameters in the equation.

**Settling Time**

The amount of time it takes for the output voltage ( $V_{IOUT}$ ) to settle to between  $\pm 3\%$  of the steady state output. see Figure 19.

**Temperature Compensation**

To remove the effects temperature has on the performance of the ACS37002, an internal temperature sensor is integrated. This sensor and compensation algorithms help to standardize device performance over the full range of operating temperatures.

**Temperature Compensation Update Rate**

There is about an 8 ms update time that is required to maintain a valid temperature compensated output; that is, temperature compensations are calculated and applied every 8 ms.

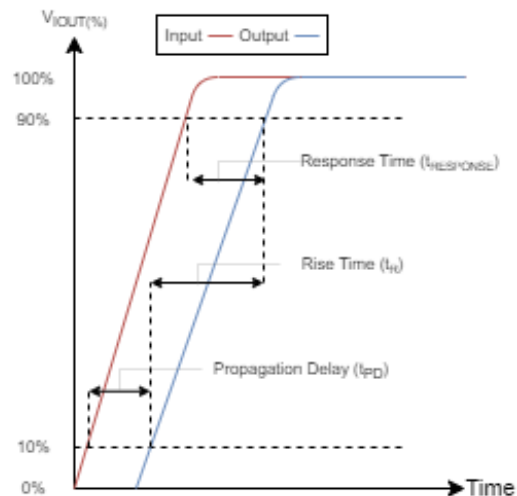


Figure 18: Dynamic Response Parameters

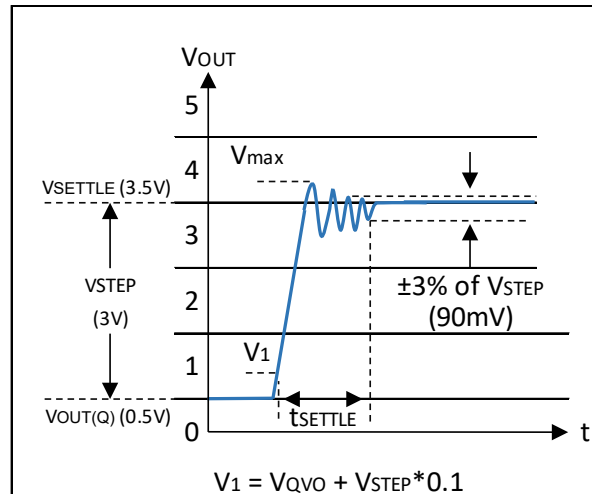
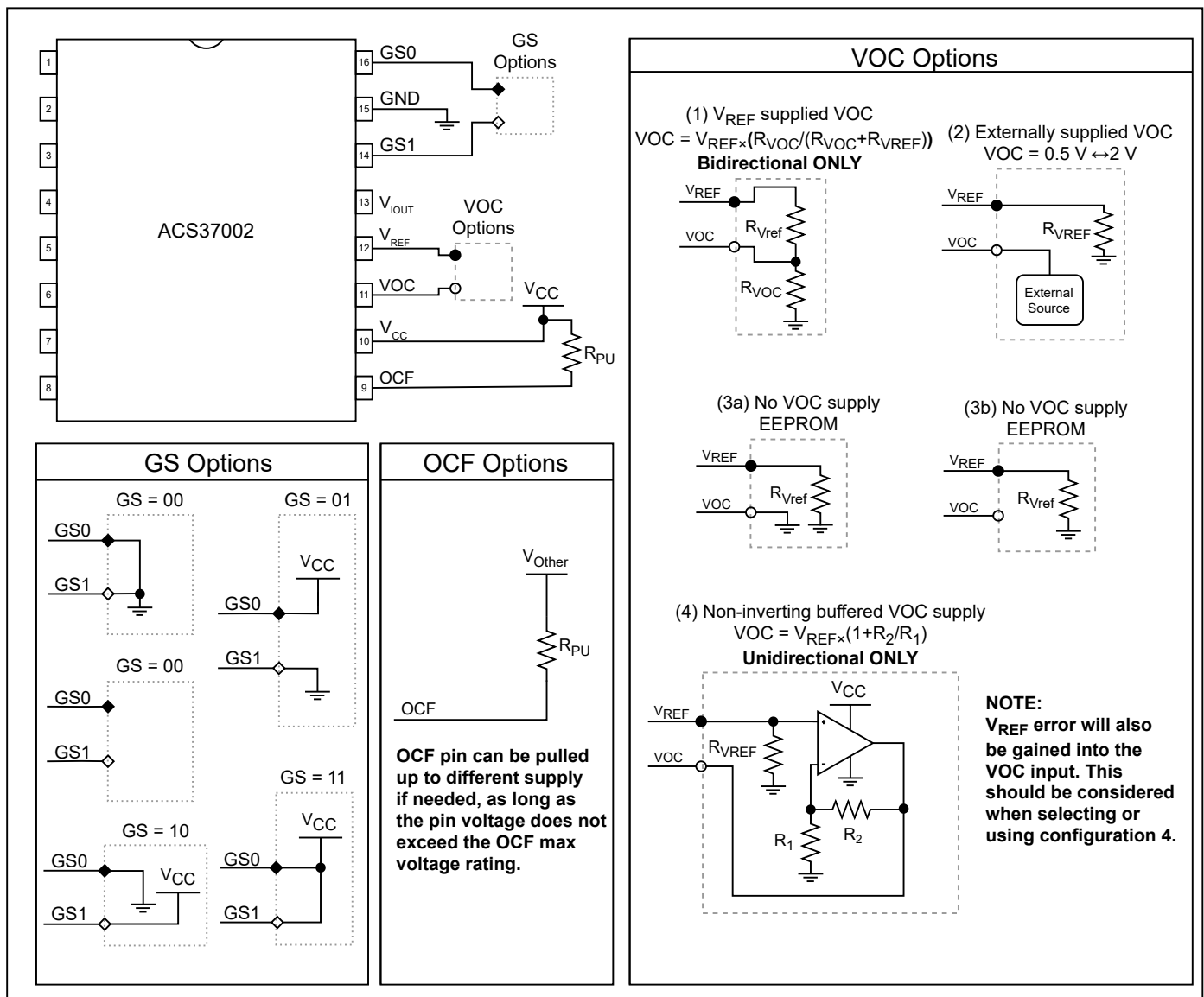


Figure 19: Overshoot and Settling Time (3 V step shown)



### APPLICATION AND THEORY

#### Application Circuits



**Figure 20: Applications Circuits for GAIN\_SEL, VOC, and FAULT pin**

These configurations are simplified to the network required for functionality.

Bypass and load capacitors are recommend for best performance.

Theory and Functionality – VOC and OCF

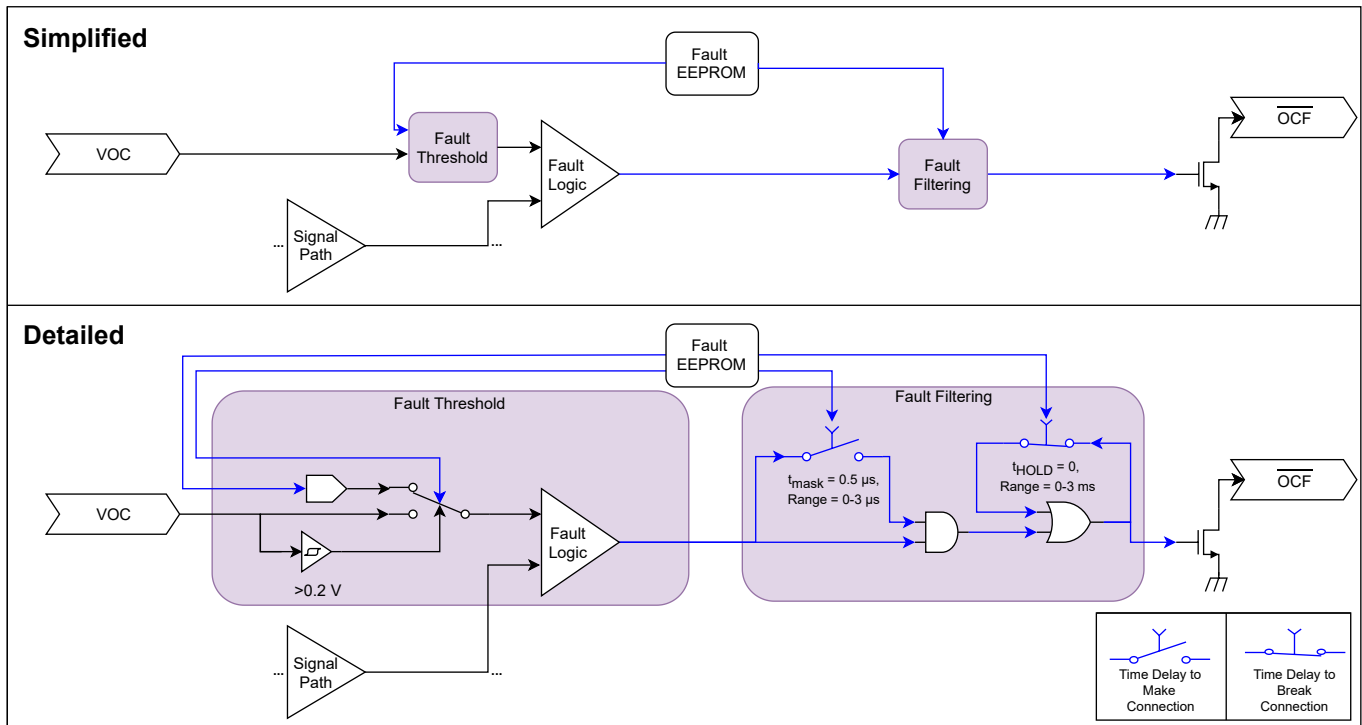


Figure 21: OCF Signal Path Simplified and Detailed Blocks of Functionality

VOC DRIVEN BY NON-INVERTING BUFFERED VREF

If the VOC pin is being driven by a non-inverted buffered  $V_{REF}$ , it is important to consider that any error from the  $V_{REF}$  pin will be gained as well. For instance, if  $V_{REF}$  error is +10 mV and the gain  $GM = 4$  for the non-inverting op-amp, then the VOC pin will be 40 mV from the expected target. For unidirectional devices, OCF would be subjected to an additional 4% error due to the error propagation from  $V_{REF}$  through the gain stage.

POWER SUPPLY DECOUPLING CAPACITOR AND OUTPUT CAPACITIVE LOADS

The higher the capacitive load on the outputs ( $V_{REF}$ ,  $V_{IOUT}$ ), the larger the decoupling capacitor should be on the power supply ( $V_{CC}$ ) to maintain performance. With less than 1 nF  $C_{LOAD}$  on the outputs, use 100 nF  $C_{BYPASS}$ ; if 2 to 3 nF  $C_{LOAD}$ , use 1  $\mu F$   $C_{BYPASS}$ ; if  $C_{LOAD}$  is 6 nF, use 10  $\mu F$   $C_{BYPASS}$ .

### Dynamically Change Gain in a System

The ACS37002 has GAIN\_SEL pins that are used to change the gain of a device on startup. If a more dynamic gain is desired, then drop  $V_{CC}$  below  $V_{POR(L)}$  and restart the device by returning  $V_{CC}$  to the nominal voltage with the new desired GAIN\_SEL configuration. The GAIN\_SEL pin voltage must greater than the

desired configuration voltage ( $V_{H(SEL)}$  or  $V_{L(SEL)}$ ) at or before  $V_{CC} > V_{POR(H)}$  in order to successfully change the device gain. The GAIN\_SEL pin voltage is latched at startup, and any changes to the pin voltages after the devices  $V_{IOUT}$  comes out of high Z will not affect gain. The cycle time to complete this operation is up to  $2 \times t_{POD}$ .

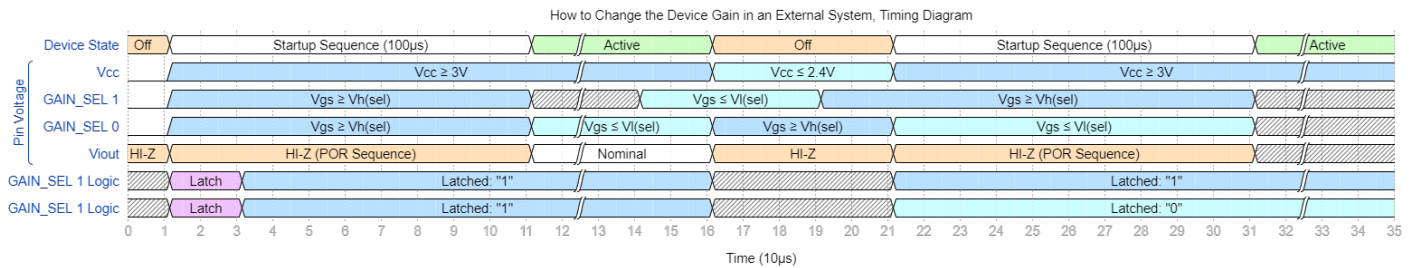


Figure 22: GAIN\_SEL Dynamic Gain Changing Timing Diagram

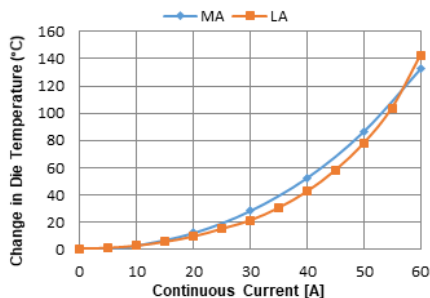
### THERMAL PERFORMANCE

#### Thermal Rise vs. Primary Current

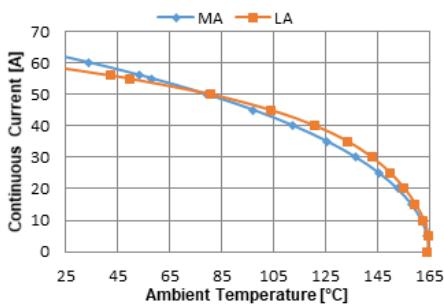
Self-heating due to the flow of current should be considered during the design of any current sensing system. The sensor, printed circuit board (PCB), and contacts to the PCB will generate heat as current moves through the system.

The thermal response is highly dependent on PCB layout, copper thickness, cooling techniques, and the profile of the injected current. The current profile includes peak current, current “on-time”, and duty cycle. While the data presented in this section was collected with direct current (DC), these numbers may be used to approximate thermal response for both AC signals and current pulses.

The plot in Figure 23 shows the measured rise in steady-state die temperature of the ACS37002 versus continuous current at an ambient temperature,  $T_A$ , of 25 °C. The thermal offset curves may be directly applied to other values of  $T_A$ . Conversely, Figure 24 shows the maximum continuous current at a given  $T_A$ . Surges beyond the maximum current listed in Figure 25 are allowed given the maximum junction temperature,  $T_{J(MAX)}$  (165°C), is not exceeded.



**Figure 23: Self heating in the MA and LA package due to current flow**

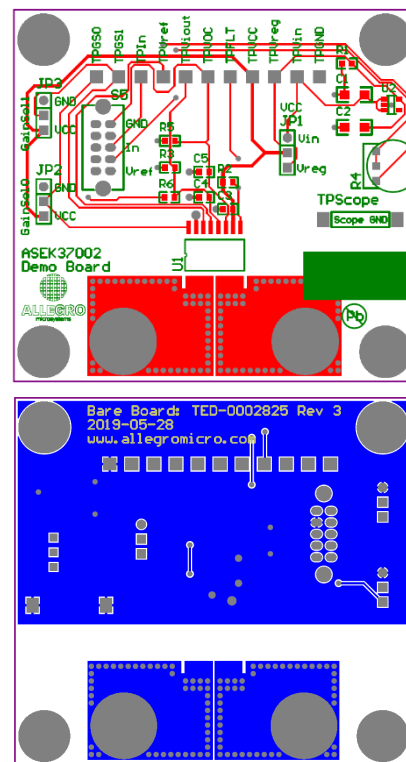


**Figure 24: Maximum Continuous Current at a Given  $T_A$**

The thermal capacity of the ACS37002 should be verified by the end user in the application’s specific conditions. The maximum junction temperature,  $T_{J(MAX)}$  (165°C), should not be exceeded. Further information on this application testing is available in the [DC and Transient Current Capability](#) application note on the Allegro website.

#### Evaluation Board Layout

Thermal data shown in Figure 23 and Figure 24 was collected using the ASEK37002 Evaluation Board (TED-0002825). This board includes 750 mm<sup>2</sup> of 4 oz. copper (0.1388 mm) connected to pins 1 through 4, and to pins 5 through 8, with thermal vias connecting the layers. Top and bottom layers of the PCB are shown below in Figure 25.



**Figure 25: Top and Bottom Layers for ASEK37002 Evaluation Board**

Gerber files for the ASEK37002 evaluation board are available for download from the Allegro website. See the technical documents section of the ACS37002 webpage.

PACKAGE OUTLINE DRAWINGS

For Reference Only – Not for Tooling Use

(Reference MS-013AA)

NOT TO SCALE

Dimensions in millimeters

Dimensions exclusive of mold flash, gate burrs, and dambar protrusions  
Exact case and lead configuration at supplier discretion within limits shown

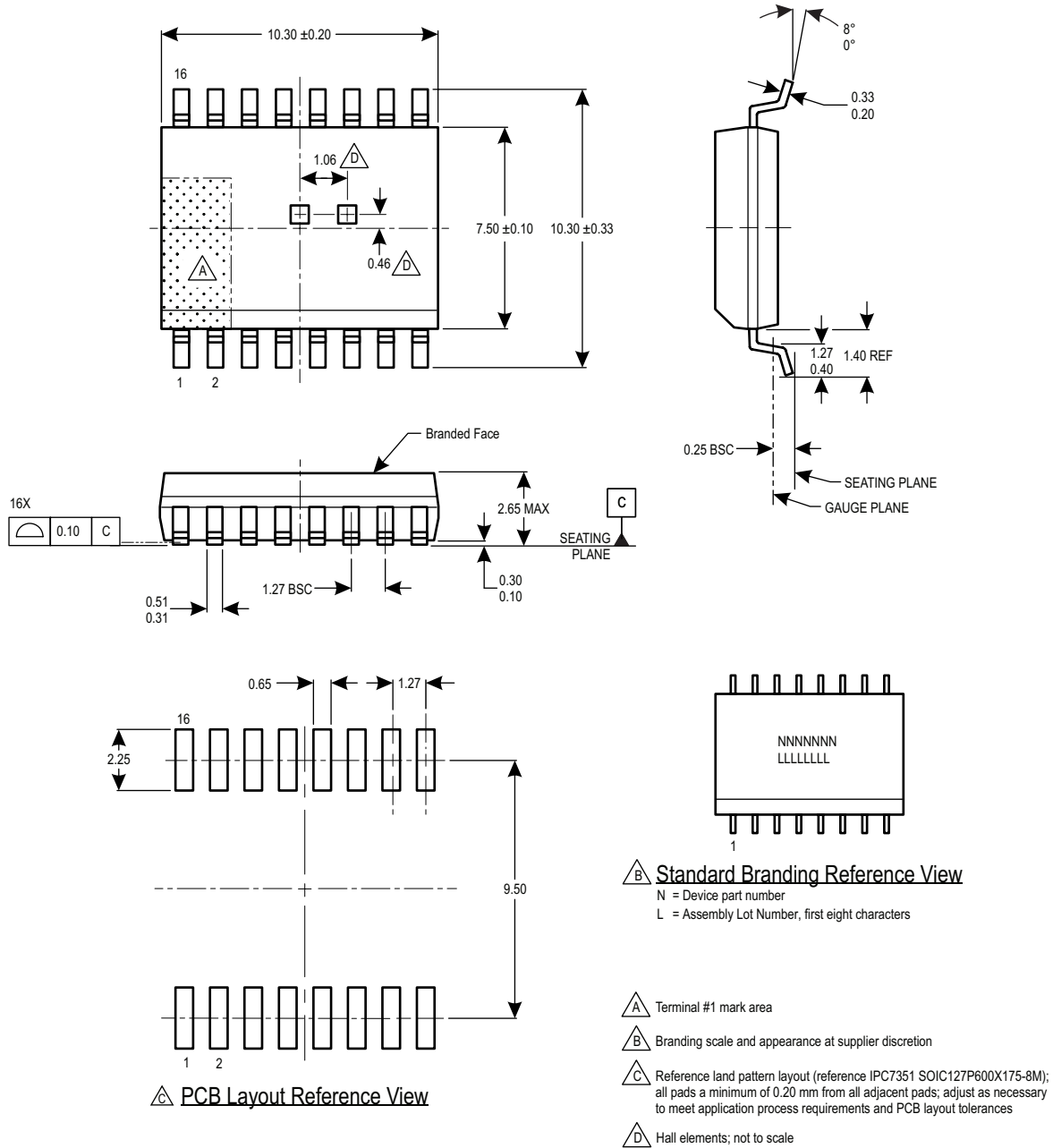


Figure 26: Package MA, 16-Pin SOICW

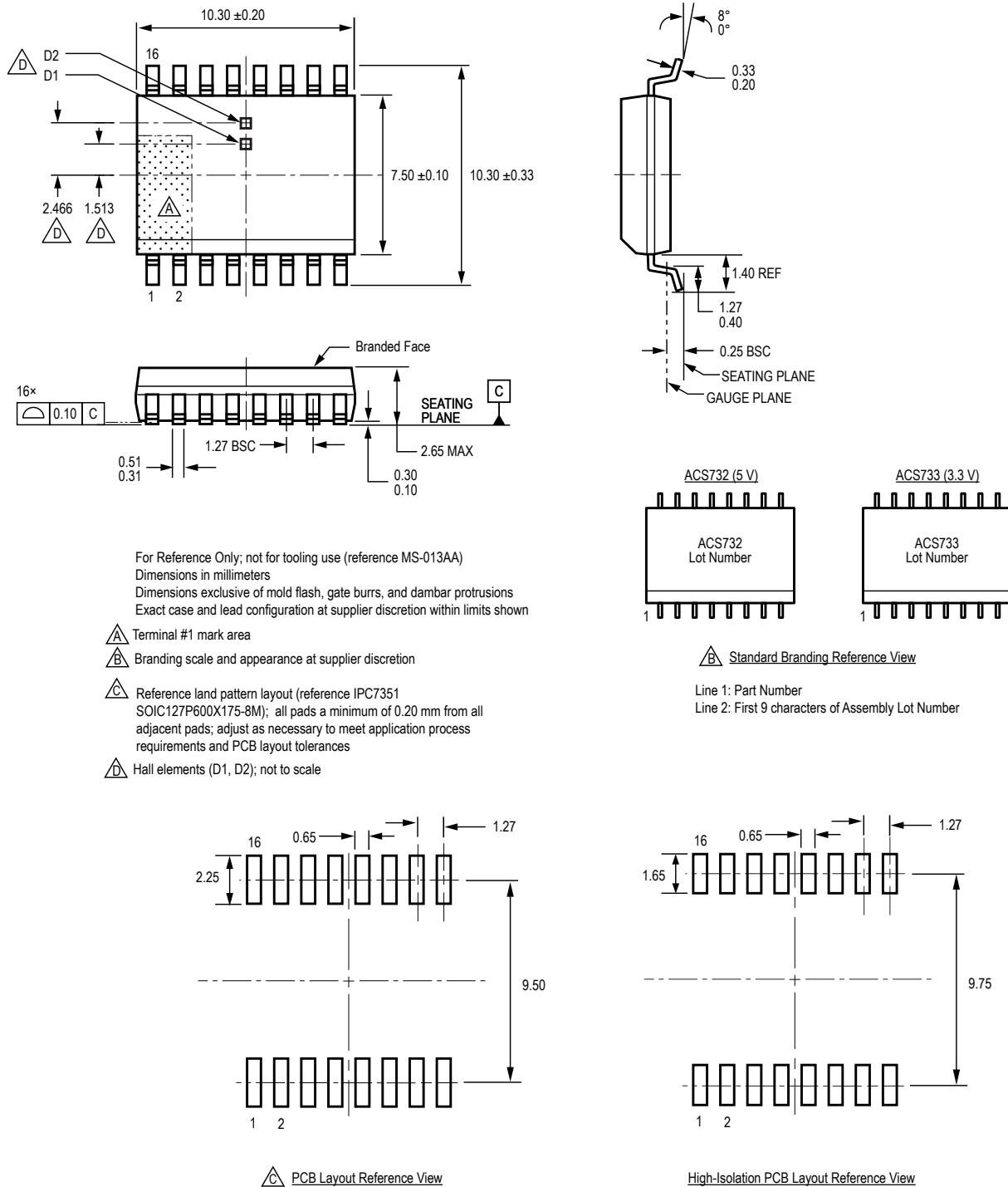


Figure 27: Package LA, 16-PIN SOICW

### Revision History

Number	Date	Description
-	June 23, 2020	Initial release

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