ACS37612

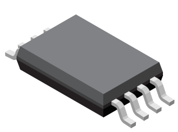
Coreless, High Precision, Hall-Effect Current Sensor IC
with Common-Mode Field Rejection and High Bandwidth (240 kHz)

FEATURES AND BENEFITS

- Eliminates need for concentrator core or shield
- Suited for applications where current flows through busbar or PCB
- Very wide sensing range (2.5 to 20 mV/G)
  - Ideal for sensing currents from <200 A to >1000 A
- Factory-programmed segmented linear temperature compensation (TC) provides low thermal drift
  - Sensitivity ±1% (typ)
  - Offset ±3 mV (typ)
- Differential Hall sensing rejects common-mode magnetic fields
- High operating bandwidth: DC to 240 kHz
- AEC-Q100 Grade 0, automotive qualified
- Contactless, lossless, non-invasive current sensing
- Very fast response time (<2 µs typ)
- 3.3 or 5.0 V single supply operation
- Ratiometric output with unidirectional and bidirectional modes
- Immune to mechanical stress
- Monolithic Hall IC for high reliability
- Wide ambient temperature range: –40°C to 150°C
- Surface mount, small footprint, low-profile TSSOP8 package

PACKAGE:

8-pin TSSOP package (suffix LU)



Not to scale

DESCRIPTION

The Allegro ACS37612 current sensor IC enables low-cost solutions for AC and DC current sensing without the need for an external field concentrator core or shield. It is designed for applications where hundreds of amps flow through a busbar or PCB.

Current flowing through a busbar or PCB trace generates a magnetic field that is sensed by the monolithic, low-offset, linear Hall IC. The differential sensing topology virtually eliminates all types of errors due to common-mode stray magnetic fields. High isolation is achieved via the no-contact nature of this simple assembly.

The ACS37612 is offered in 120 kHz and 240 kHz bandwidth options, making it ideal for inverter phase current sensing, load detection and management, power supplies, and DC/DC converters where fast switching is required. The fast response time enables overcurrent fault detection in safety-critical applications. A –40°C to 150°C ambient operating temperature range and a stellar ESD rating make it ready for harsh automotive environments.

The ACS37612 is suitable for space-constrained applications because of its low-profile 8-pin surface mount TSSOP package (thin-shrink small outline package, suffix LU) that is lead (Pb) free, with 100% matte tin leadframe plating.

TYPICAL APPLICATIONS

- High voltage traction motor inverter
- 48 V / 12 V auxiliary inverter
- Battery monitoring
- Overcurrent detection
- DC/DC converter
- Smart fuse
- Power distribution unit (PDU)
- Power supply

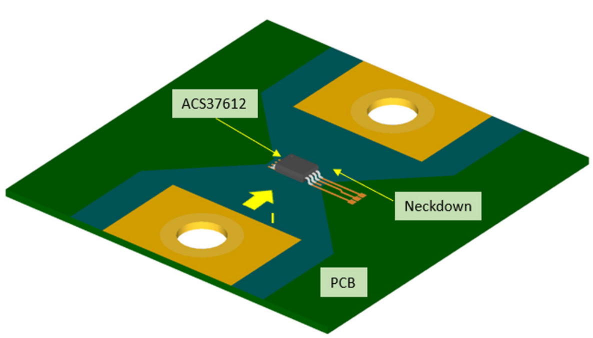


Figure 1: Current Through PCB

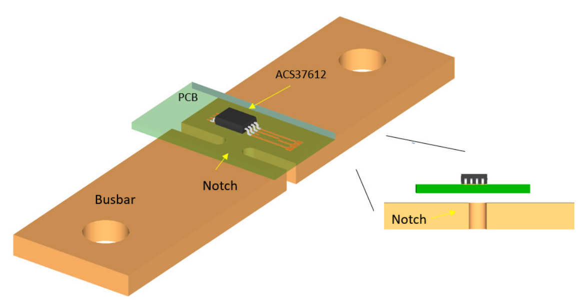
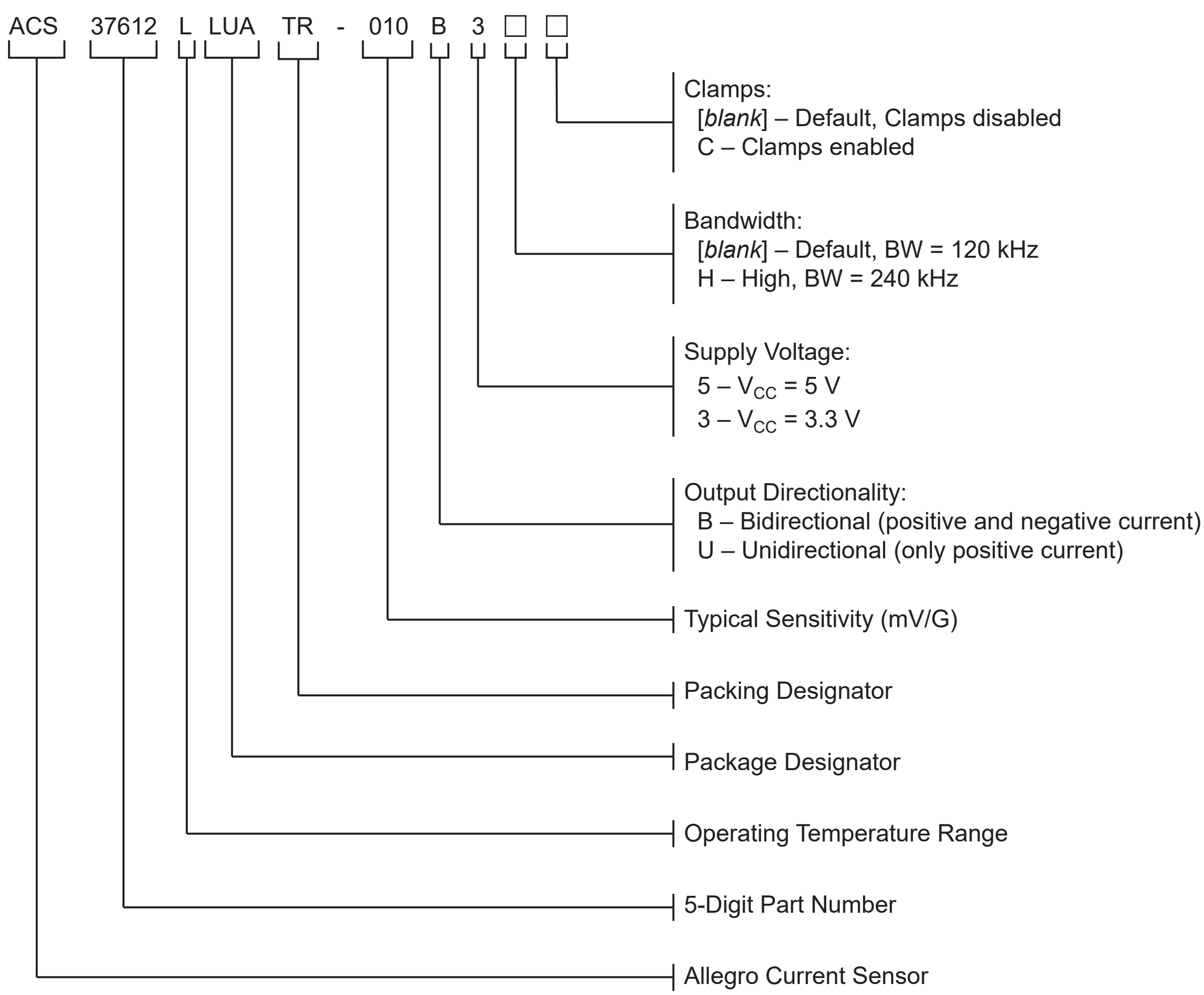


Figure 2: Current Through Busbar

SELECTION GUIDE

Part Number	Nominal Supply Voltage (V)	Differential Magnetic Input Range, (G)	Sensitivity Sens (Typ.) (mV/G) [1]	Bandwidth (kHz)	T_A (°C)	Packing [2]
ACS37612LLUATR-010B3	3.3	±135	10	120	–40 to 150	4000 pieces per 13-inch reel
ACS37612LLUATR-005B5	5	±400	5			
ACS37612LLUATR-010B5	5	±200	10			
ACS37612LLUATR-010B5-C	5	±200	10			
ACS37612LLUATR-015B5	5	±130	15			
ACS37612LLUATR-015U5	5	0 to 265	15			

[1] Measured at nominal supply voltage. Contact Allegro for other sensitivity options.
[2] Contact Allegro for additional packing options.



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COMMON OPERATING CHARACTERISTICS: Valid through full range of T_A and V_{CC}, unless otherwise specified

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
ELECTRICAL CHARACTERISTICS							
Supply Voltage	V_{CC}	5 V nominal supply voltage variant		4.5	5	5.5	V
		3.3 V nominal supply voltage variant		3	3.3	3.6	V
Supply Current	I_{CC}	V_{CC}(min) ≤ V_{CC} ≤ V_{CC}(max), where V_{CC} = 5 V or 3.3 V, no load on output		–	12	16	mA
Power-On Time	t_{PO}	T_A = 25°C		–	70	–	µs
Temperature Compensation Power-On Time	t_{TC}	T_A = 25°C, C_L (of test probe) = 10 pF, C_{BYPASS} = open		–	45	–	µs
Undervoltage Lockout (UVLO) Threshold [1]	V_{UVLOD}	V_{CC} rising; UVLO is disabled, enabling the device output; T_A = 25°C		–	3.8	4.2	V
	V_{UVLOE}	V_{CC} falling; UVLO is enabled, disabling the device output; T_A = 25°C		3.45	3.7	–	V
UVLO Hysteresis	$V_{UVLO(HYS)}$	T_A = 25°C		–	100	–	mV
UVLO Enable/Disable Delay Time	t_{UVLOE}	Time measured from falling V_{CC} < V_{UVLOE} to UVLO enabled; T_A = 25°C		–	74	–	µs
	t_{UVLOD}	Time measured from rising V_{CC} > V_{UVLOD} to UVLO disabled; T_A = 25°C		–	7	–	µs
Power-On Release Delay	t_{PORD}	T_A = 25°C, 3.3 V part variant only		–	7	–	µs
Power-On Reset Voltage	V_{PORH}	T_A = 25°C, V_{CC} rising		–	2.8	–	V
	V_{PORL}	T_A = 25°C, V_{CC} falling		–	2.5	–	V
Power-On Reset Release Time	t_{PORR}	T_A = 25°C, V_{CC} rising		–	64	–	µs
Power-On Reset Hysteresis	$V_{Hys(POR)}$			–	250	–	mV
Internal Bandwidth	BW_i	Small signal –3 dB, C_L = 1 nF, device programmed to lowest bandwidth mode (default)		–	120	–	kHz
		Small signal –3 dB, C_L = 1 nF, device programmed to highest bandwidth mode		–	240	–	kHz
Rise Time [2]	t_r	T_A = 25°C, C_L = 1 nF	BW_i = 240 kHz	–	1.7	–	µs
			BW_i = 120 kHz	–	3.2	–	µs
Propagation Delay [2]	t_{PD}	T_A = 25°C, C_L = 1 nF	BW_i = 240 kHz	–	1	–	µs
			BW_i = 120 kHz	–	1.5	–	µs
Response Time [2]	$t_{RESPONSE}$	T_A = 25°C, C_L = 1 nF	BW_i = 240 kHz	–	1.6	–	µs
			BW_i = 120 kHz	–	3.2	–	µs
DC Output Impedance	R_{OUT}			–	< 1	–	Ω
Output Load Resistance	R_L	VOUT to GND		4.7	10	–	kΩ
Output Load Capacitance	C_L	VOUT to GND		–	1	10	nF
Output Voltage Clamp (Clamp Enable Option Only)	$V_{CLP(HIGH)}$	T_A = 25°C, $R_{L(PULLDWN)}$ = 10 kΩ to GND		0.9 × V_{CC}	–	–	V
	$V_{CLP(LOW)}$	T_A = 25°C, $R_{L(PULLUP)}$ = 10 kΩ to VCC		–	–	0.1 × V_{CC}	V
Delay to Clamp (Clamp Enable Option Only)	t_{CLP}	T_A = 25°C; C_L = 1nF; Step from 75% output range to 150%		–	5	–	µs
Output Saturation Voltage (Clamp Disabled Option Only)	$V_{SAT(HIGH)}$	T_A = 25°C, $R_{L(PULLDWN)}$ = 10 kΩ to GND		V_{CC} – 0.2	–	–	V
	$V_{SAT(LOW)}$	T_A = 25°C, $R_{L(PULLUP)}$ = 10 kΩ to VCC		–	–	200	mV

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