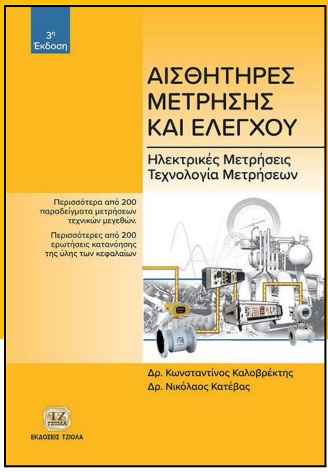
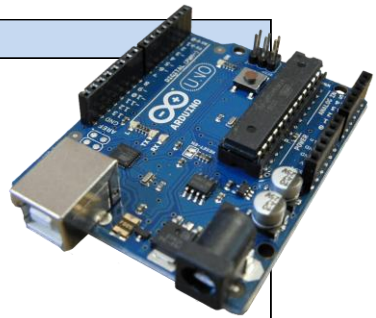


Εργασία / Arduino QR 11.1:
Μέτρηση έντασης ρεύματος

Πληροφορίες

Χρησιμοποιώντας το στοιχείο ACS758, δημιουργήστε εφαρμογής μέτρησης ρεύματος με Arduino. Το εγχειρίδιο του κατασκευαστή δίνεται στη συνέχεια.



Σχεδίαση διάταξης

Παράθυρο συγγραφής του κώδικα

Thermally Enhanced, Fully Integrated, Hall Effect-Based Linear Current Sensor IC with 100 μΩ Current Conductor

Features and Benefits

- Industry-leading noise performance through proprietary amplifier and filter design techniques
- Integrated shield greatly reduces capacitive coupling from current conductor to die due to high dV/dt signals, and prevents offset drift in high-side, high voltage applications
- Total output error improvement through gain and offset trim over temperature
- Small package size, with easy mounting capability
- Monolithic Hall IC for high reliability
- Ultra-low power loss: 100 μΩ internal conductor resistance
- Galvanic isolation allows use in economical, high-side current sensing in high voltage systems
- 3.0 to 5.5 V, single supply operation

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TÜV America
Certificate Number:
U8V 09 05 54214 021

Package: 5-pin package

PSS
Leadform

PFF
Leadform

Additional leadforms available for qualifying volumes

Description

The Allegro® ACS758 family of current sensor ICs provides economical and precise solutions for AC or DC current sensing. Typical applications include motor control, load detection and management, power supply and DC-to-DC converter control, inverter control, and overcurrent fault detection.

The device consists of a precision, low-offset linear Hall circuit with a copper conduction path located near the die. Applied current flowing through this copper conduction path generates a magnetic field which the Hall IC converts into a proportional voltage. Device accuracy is optimized through the close proximity of the magnetic signal to the Hall transducer. A precise, proportional output voltage is provided by the low-offset, chopper-stabilized BiCMOS Hall IC, which is programmed for accuracy at the factory.

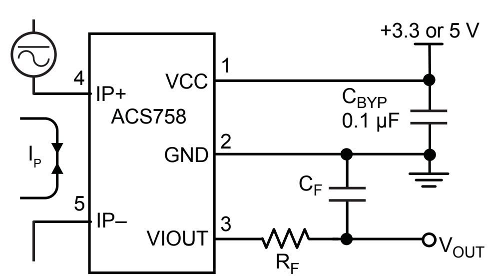
High level immunity to current conductor dV/dt and stray electric fields, offered by Allegro proprietary integrated shield technology, guarantees low output voltage ripple and low offset drift in high-side, high voltage applications.

The output of the device has a positive slope (>V_{CC} / 2) when an increasing current flows through the primary copper conduction path (from terminal 4 to terminal 5), which is the path used for current sampling. The internal resistance of this conductive path is 100 μΩ typical, providing low power loss.

The thickness of the copper conductor allows survival of the device at high overcurrent conditions. The terminals of the

Continued on the next page…

Typical Application



Application 1. The ACS758 outputs an analog signal, V_{OUT}, that varies linearly with the uni- or bi-directional AC or DC primary sampled current, I_P, within the range specified. C_F is for optimal noise management, with values that depend on the application.

Features and Benefits (continued)

- 120 kHz typical bandwidth
- 3 μs output rise time in response to step input current
- Output voltage proportional to AC or DC currents
- Factory-trimmed for accuracy
- Extremely stable output offset voltage
- Nearly zero magnetic hysteresis

Description (continued)

conductive path are electrically isolated from the signal leads (pins 1 through 3). This allows the ACS758 family of sensor ICs to be used in applications requiring electrical isolation without the use of opto-isolators or other costly isolation techniques.

The device is fully calibrated prior to shipment from the factory. The ACS758 family is lead (Pb) free. All leads are plated with 100% matte tin, and there is no Pb inside the package. The heavy gauge leadframe is made of oxygen-free copper.

Selection Guide

Part Number[1]	Package		Primary Sampled Current , I_P (A)	Sensitivity Sens (Typ.) (mV/A)	Current Directionality	T_{OP} (°C)	Packing[2]
	Terminals	Signal Pins					
ACS758LCB-050B-PFF-T	Formed	Formed	±50	40	Bidirectional	–40 to 150	34 pieces per tube
ACS758LCB-050U-PFF-T	Formed	Formed	50	60	Unidirectional		
ACS758LCB-100B-PFF-T	Formed	Formed	±100	20	Bidirectional		
ACS758LCB-100U-PFF-T	Formed	Formed	100	40	Unidirectional		
ACS758KCB-150B-PFF-T	Formed	Formed	±150	13.3	Bidirectional	–40 to 125	
ACS758KCB-150U-PFF-T	Formed	Formed	150	26.7	Unidirectional		
ACS758KCB-150B-PSS-T	Straight	Straight	±150	13.3	Bidirectional		
ACS758ECB-200B-PFF-T	Formed	Formed	±200	10	Bidirectional	–40 to 85	
ACS758ECB-200U-PFF-T	Formed	Formed	200	20	Unidirectional		
ACS758ECB-200B-PSS-T	Straight	Straight	±200	10	Bidirectional		

[1]Additional leadform options available for qualified volumes.
[2]Contact Allegro for additional packing options.

Absolute Maximum Ratings

Characteristic	Symbol	Notes	Rating	Units
Forward Supply Voltage	V_{CC}		8	V
Reverse Supply Voltage	V_{RCC}		–0.5	V
Working Voltage for Reinforced Isolation	$V_{WORKING-R}$	Voltage applied between pins 1-3 and 4-5; tested at 3000 VAC for 1 minute according to UL standard 60950-1	353	VDC / V_{pk}
Working Voltage for Basic Isolation	$V_{WORKING-B}$	Voltage applied between pins 1-3 and 4-5; tested at 3000 VAC for 1 minute according to UL standard 60950-1	500	VDC / V_{pk}
Forward Output Voltage	V_{IOUT}		28	V
Reverse Output Voltage	V_{RIOUT}		–0.5	V
Output Source Current	$I_{OUT(Source)}$	VIOUT to GND	3	mA
Output Sink Current	$I_{OUT(Sink)}$	VCC to VIOUT	1	mA
Nominal Operating Ambient Temperature	T_{OP}	Range E	–40 to 85	ºC
		Range K	–40 to 125	ºC
		Range L	–40 to 150	ºC
Maximum Junction	T_J(max)		165	ºC
Storage Temperature	T_{stg}		–65 to 165	ºC

Thermal Characteristics may require derating at maximum conditions

Characteristic	Symbol	Test Conditions*	Value	Unit
Package Thermal Resistance	$R_{\theta JA}$	Mounted on the Allegro evaluation board with 2800 mm^2 (1400 mm^2 on component side and 1400 mm^2 on opposite side) of 4 oz. copper connected to the primary leadframe and with thermal vias connecting the copper layers. Performance is based on current flowing through the primary leadframe and includes the power consumed by the PCB.	7	ºC/W

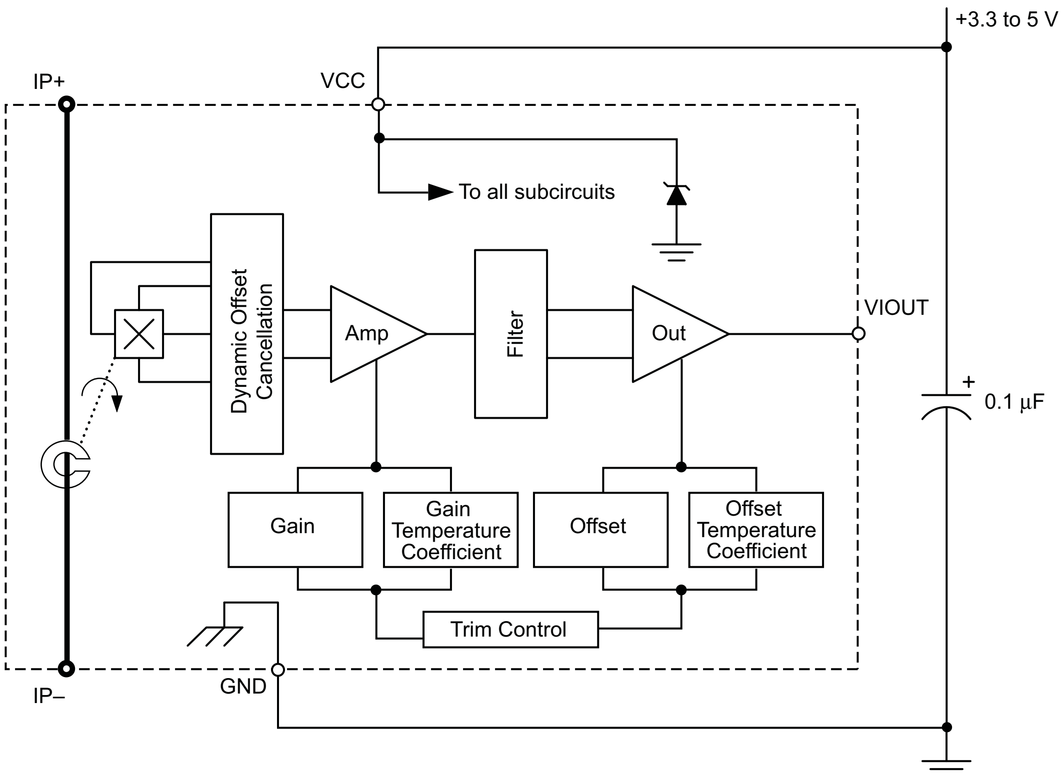
*Additional thermal information available on the Allegro website

Typical Overcurrent Capabilities[1,2]

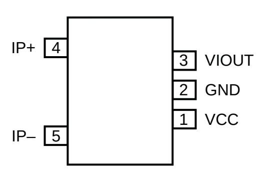
Characteristic	Symbol	Notes	Rating	Units
Overcurrent	I_{POC}	T_A = 25°C, 1s duration, 1% duty cycle	1200	A
		T_A = 85°C, 1s duration, 1% duty cycle	900	A
		T_A = 150°C, 1s duration, 1% duty cycle	600	A

[1]Test was done with Allegro evaluation board. The maximum allowed current is limited by T_J(max) only.
[2]For more overcurrent profiles, please see FAQ on the Allegro website, www.allegromicro.com.

Functional Block Diagram



Pin-out Diagram



Terminal List Table

Number	Name	Description
1	VCC	Device power supply terminal
2	GND	Signal ground terminal
3	VIOUT	Analog output signal
4	IP+	Terminal for current being sampled
5	IP–	Terminal for current being sampled

Allegro MicroSystems, Inc.
115 Northeast Cutoff
Worcester, Massachusetts 01615-0036 U.S.A.
1.508.853.5000; www.allegromicro.com

COMMON OPERATING CHARACTERISTICS[1] valid at T_{OP} = –40°C to 150°C and V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Supply Voltage	V_{CC}		3	5.0	5.5	V
Supply Current	I_{CC}	Output open	–	10	13.5	mA
Power-On Delay	t_{POD}	T_A = 25°C	–	10	–	μs
Rise Time[2]	t_r	I_P step = 60% of I_P+, 10% to 90% rise time, T_A = 25°C, C_{OUT} = 0.47 nF	–	3	–	μs
Propagation Delay Time[2]	t_{PROP}	T_A = 25°C, C_{OUT} = 0.47 nF	–	1	–	μs
Response Time	$t_{RESPONSE}$	Measured as sum of t_{PROP} and t_r	–	4	–	μs
Internal Bandwidth[3]	BW_i	–3 dB; T_A = 25°C, C_{OUT} = 0.47 nF	–	120	–	kHz
Output Load Resistance	$R_{LOAD(MIN)}$	VIOUT to GND	4.7	–	–	kΩ
Output Load Capacitance	$C_{LOAD(MAX)}$	VIOUT to GND	–	–	10	nF
Primary Conductor Resistance	$R_{PRIMARY}$	T_A = 25°C	–	100	–	μΩ
Symmetry[2]	E_{SYM}	Over half-scale of Ip	99	100	101	%
Quiescent Output Voltage[4]	$V_{IOUT(QBI)}$	Bidirectional variant, I_P = 0 A, T_A = 25°C	–	$V_{CC}/2$	–	V
	$V_{IOUT(QUNI)}$	Unidirectional variant, I_P = 0 A, T_A = 25°C, $V_{IOUT(QUNI)}$ is ratiometric to V_{CC}	–	0.6	–	V
Ratiometry[2]	V_{RAT}	V_{CC} = 4.5 to 5.5 V	–	100	–	%

[1]Device is factory-trimmed at 5 V, for optimal accuracy.
[2]See Characteristic Definitions section of this datasheet.
[3]Calculated using the formula $BW_i = 0.35 / t_r$.
[4]$V_{IOUT(Q)}$ may drift over the lifetime of the device by as much as ±25 mV.