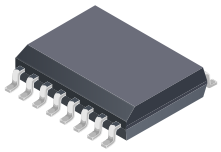
ACS732 and ACS733

1 MHz Bandwidth, Galvanically Isolated Current Sensor IC in SOIC-16 Package

FEATURES AND BENEFITS

- AEC-Q100 automotive qualified
- High bandwidth, 1 MHz analog output
- Differential Hall sensing rejects common-mode fields
- High-isolation SOIC16 wide body package provides galvanic isolation for high-voltage applications
- Integrated shield virtually eliminates capacitive coupling from current conductor to die, greatly suppressing output noise due to high dv/dt transients
- Industry-leading noise performance with greatly improved bandwidth through proprietary amplifier and filter design
- UL60950-1 (ed. 2) certified
  - □ Dielectric Strength Voltage = 3.6 kV_{RMS}
  - □ Basic Isolation Working Voltage = 616 V_{RMS}
- Fast and externally configurable overcurrent fault detection
- 1 mΩ primary conductor resistance for low power loss and high inrush current withstand capability
- Options for 3.3 V and 5 V single supply operation
- Output voltage proportional to AC and DC current
- Factory-trimmed sensitivity and quiescent output voltage for improved accuracy
- Nearly zero magnetic hysteresis
- Ratiometric output from supply voltage

PACKAGE: 16-Pin SOICW (suffix LA)



Not to scale

CB Certificate Number: US-23711-A2-UL

DESCRIPTION

The ACS732 and ACS733 are a new generation of high bandwidth current sensor ICs from Allegro™. These devices provide a compact, fast, and accurate solution for measuring high-frequency currents in DC/DC converters and other switching power applications. The ACS732 and ACS733 offer high isolation, high bandwidth Hall-effect-based current sensing with user-configurable overcurrent fault detection. These features make them ideally suited for high-frequency transformer and current transformer replacement in applications running at high voltages.

The ACS732 and ACS733 are suitable for all markets, including automotive, industrial, commercial, and communications systems. They may be used in motor control, load detection and management, switch-mode power supplies, and overcurrent fault protection applications.

The wide body SOIC-16 package allows for easy implementation. Applied current flowing through the copper conduction path generates a magnetic field that is sensed by the IC and converted to a proportional voltage. Current is sensed differentially in order to reject external common-mode fields. Device accuracy is optimized through the close proximity of the magnetic field to the Hall transducers. A precise, proportional voltage is provided by the Hall IC, which is factory-programmed after packaging for high accuracy. The fully integrated package has an internal copper conductive path with a typical resistance of 1 mΩ, providing low power loss.

The current-carrying pins (pins 1 through 8) are electrically isolated from the sensor leads (pins 9 through 16). This allows the devices to be used in high-side current sensing applications without the use of high-side differential amplifiers or other costly isolation techniques.

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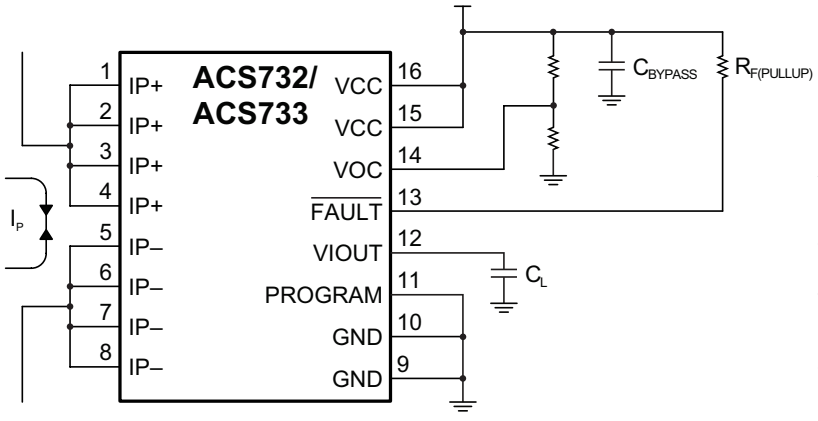

ACS732/ACS733 outputs an analog signal, V_{IOUT}, that changes proportionally with the bidirectional AC or DC primary sensed current, I_P, within the specified measurement range.

The overcurrent threshold may be set with a resistor divider tied to the V_{OC} pin.

Figure 1: Typical Application Circuit

DESCRIPTION (continued)

The ACS732 and ACS733 are provided in a small, low profile, surface-mount SOIC-16 wide-body package. The leadframe is plated with 100% matte tin, which is compatible with standard lead (Pb) free printed circuit board assembly processes. Internally, the device is lead-free. These devices are fully calibrated prior to shipment from the Allegro factory.

SELECTION GUIDE

Part Number	Optimized Range, I_P (A)	Sensitivity [1], Sens(Typ) (mV/A)	Nominal Supply Voltage, V_{CC}, (V)	T_A (°C)	Packing [2]
ACS732KLATR-20AB-T	±20	100	5.0	–40 to 125	Tape and reel, 1000 pieces per reel
ACS732KLATR-40AB-T	±40	50			
ACS732KLATR-65AB-T	±65	30			
ACS732KLATR-65AU-T	65	60			
ACS732KLATR-75AB-T	±75	26.6			
ACS733KLATR-20AB-T	±20	66	3.3		
ACS733KLATR-20AB-T-H [3]	±20	66			
ACS733KLATR-40AB-T	±40	33			
ACS733KLATR-40AU-T	40	66			
ACS733KLATR-65AB-T	±65	20			

[1] Measured at Nominal Supply Voltage, V_{CC}.
[2] Contact Allegro for additional packing options.
[3] -H denotes 100% cold calibration at the Allegro factory for improved accuracy.

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ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Notes	Rating	Units
Supply Voltage	V_{CC}		6	V
Reverse Supply Voltage	V_{RCC}		–0.1	V
Output Voltage	V_{IOUT}		6	V
Reverse Output Voltage	V_{RIOUT}		–0.1	V
Fault Output Voltage	V_{FAULT}		6	V
Reverse Fault Output Voltage	V_{RFAULT}		–0.1	V
Forward V_{OC} Voltage	V_{VOC}		6	V
Reverse V_{OC} Voltage	V_{VOC}		–0.1	V
Output Current	I_{OUT}	Maximum survivable sink or source current on the output	15	mA
Maximum Continuous Current	I_{CMAX}	T_A = 25°C	55	A
Nominal Operating Ambient Temperature	T_A	Range K	–40 to 125	°C
Maximum Junction Temperature	T_J(max)		165	°C
Storage Temperature	T_{stg}		–65 to 170	°C

ESD RATINGS

Characteristic	Symbol	Test Conditions	Value	Unit
Human Body Model	V_{HBM}	Per AEC-Q100	±12	kV
Charged Device Model	V_{CDM}	Per AEC-Q100	±1	kV

ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Value	Units
Dielectric Surge Strength Test Voltage	V_{SURGE}	Tested ±5 pulses at 2/minute in compliance to IEC 61000-4-5 1.2 µs (rise) / 50 µs (width).	10000	V
Dielectric Strength Test Voltage	V_{ISO}	Agency type-tested for 60 seconds per UL 60950-1 (edition 2). Production Tested at 2250 V_{RMS} per UL 60950-1.	3600	V_{RMS}
Working Voltage for Basic Isolation	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	D_{CL}	Minimum distance through air from IP leads to signal leads.	7.5	mm
Creepage	D_{CR}	Minimum distance along package body from IP leads to signal leads.	7.5	mm
Distance Through Insulation	DTI	Minimum internal distance through insulation	38	µm
Comparative Tracking Index	CTI	Material Group II	400 to 599	V

THERMAL CHARACTERISTICS [1]

Characteristic	Symbol	Test Conditions	Value	Unit
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	Mounted on the Allegro ASEK732/3 evaluation board. Performance values include the power consumed by the PCB. [2]	17	°C/W
Junction-to-Lead Thermal Resistance	$R_{\theta JL}$	Mounted on the Allegro ASEK732/3 evaluation board. [2]	5	°C/W

[1] Refer to the die temperature curves versus DC current plot (p. 29). Additional thermal information is available on the Allegro website.

[2] The Allegro evaluation board has 1500 mm^2 of 2 oz. copper on each side, connected to pins 1 through 4 and pins 5 through 8, with thermal vias connecting the layers. Performance values include the power consumed by the PCB. Further details on the board are available from the Frequently Asked Questions document on our website. Further information about board design and thermal performance also can be found in the Applications Information section of this datasheet.

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