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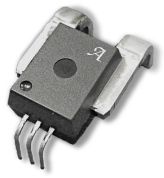
High Accuracy, Hall-Effect-Based, 200 kHz Bandwidth, Galvanically Isolated Current Sensor IC with 100 µΩ Current Conductor

FEATURES AND BENEFITS

- AEC-Q100 Grade 1 qualified
- Typical of 2.5 µs output response time
- 5 V supply operation
- Ultra-low power loss: 100 µΩ internal conductor resistance
- Reinforced galvanic isolation allows use in economical, high-side current sensing in high-voltage systems
- 4800 Vrms dielectric strength certified under UL60950-1
- Industry-leading noise performance with greatly improved bandwidth 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
- Greatly improved total output error through digitally programmed and compensated gain and offset over the full operating temperature range
- Small package size, with easy mounting capability
- Monolithic Hall IC for high reliability
- Output voltage proportional to AC or DC currents
- Factory-trimmed for accuracy
- Extremely stable output offset voltage

Package: 5-pin package (suffix CB)



Not to scale

DESCRIPTION

The Allegro™ ACS772 family of current sensor ICs provide economical and precise solutions for AC or DC current sensing, ideal for motor control, load detection and management, power supply and DC-to-DC converter control, and inverter control. The 2.5 µs response time enables overcurrent fault detection in safety-critical applications.

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. Proprietary digital temperature compensation technology greatly improves the IC accuracy and temperature stability.

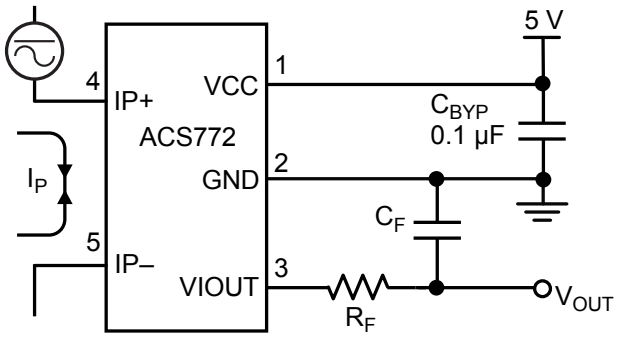
High-level immunity to current conductor dV/dt and stray electric fields is offered by Allegro proprietary integrated shield technology for low output voltage ripple and low offset drift in high-side, high-voltage applications.

The output of the device increases 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 conductive path are electrically isolated from the signal leads (pins 1 through 3). This allows the ACS772 family of sensor

Continued on the next page…

Application 1: the ACS772 outputs an analog signal, V_{OUT}, that varies linearly with the bidirectional AC or DC primary sensed current, I_P, within the range specified. R_F and C_F are for optimal noise management, with values that depend on the application.



Typical Application

DESCRIPTION (continued)

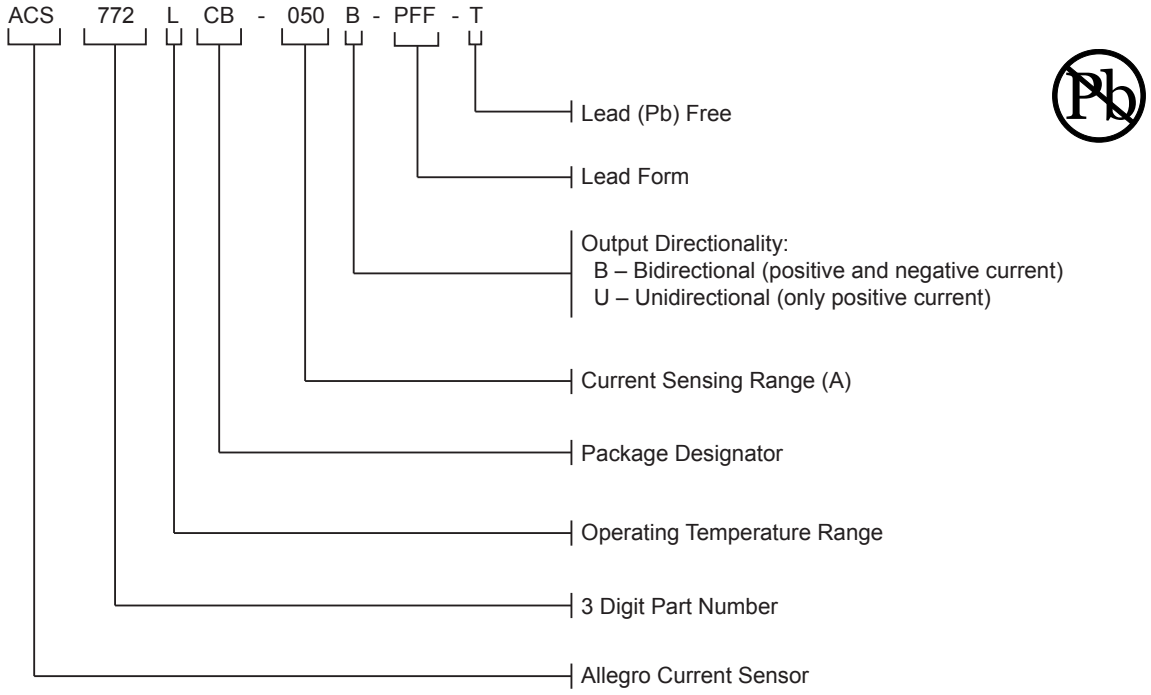
ICs to be used in applications requiring electrical isolation without the use of opto-isolators or other costly isolation techniques.

The device is fully calibrated prior to shipment from the factory. The ACS772 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) [2]	T_{OP} (°C)	Packing [3]
	Terminals	Signal Pins				
ACS772LCB-050U-PFF-T	Formed	Formed	50	80	–40 to 150	34 pieces per tube
ACS772LCB-050B-PFF-T	Formed	Formed	±50	40	–40 to 150	
ACS772LCB-100U-PFF-T	Formed	Formed	100	40	–40 to 150	
ACS772LCB-100B-PFF-T	Formed	Formed	±100	20	–40 to 150	
ACS772KCB-150U-PFF-T	Formed	Formed	150	26.66	–40 to 125	
ACS772KCB-150B-PFF-T	Formed	Formed	±150	13.33	–40 to 125	
ACS772ECB-200U-PFF-T	Formed	Formed	200	20	–40 to 85	
ACS772ECB-200B-PFF-T	Formed	Formed	±200	10	–40 to 85	
ACS772ECB-250U-PFF-T	Formed	Formed	250	16	–40 to 85	
ACS772ECB-250B-PFF-T	Formed	Formed	±250	8	–40 to 85	

[1] Additional leadform and Sensitivity options available for qualified volumes.
[2] Measured at V_{CC} = 5 V.
[3] Contact Allegro for additional packing options.



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ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Notes	Rating	Unit
Supply Voltage	V_{CC}		6.5	V
Reverse Supply Voltage	V_{RCC}		–0.5	V
Output Voltage	V_{IOUT}		6.5	V
Reverse Output Voltage	V_{RIOUT}		–0.5	V
Output Source Current	$I_{OUT(Source)}$	VIOUT to GND	3	mA
Output Sink Current	$I_{OUT(Sink)}$	Minimum pull-up resistor of 500 Ω from VCC to VIOUT	10	mA
Nominal Operating Ambient Temperature	T_A	Range E	–40 to 85	°C
		Range K	–40 to 125	°C
		Range L	–40 to 150	°C
Maximum Junction Temperature	T_J(max)		165	°C
Storage Temperature	T_{stg}		–65 to 165	°C

ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Rating	Unit
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)	8000	V
Dielectric Strength Test Voltage [1]	V_{ISO}	Agency type-tested for 60 seconds per UL standard 60950-1, 2nd Edition. Tested at 3000 V_{RMS} for 1 second in production.	4800	V_{RMS}
Working Voltage for Basic Isolation	V_{WVBI}	For basic (single) isolation per UL standard 60950-1, 2nd Edition	990	V_{PK} or V_{DC}
			700	V_{RMS}
Working Voltage for Reinforced Isolation	V_{WFRI}	For reinforced (double) isolation per UL standard 60950-1, 2nd Edition	636	V_{PK} or V_{DC}
			450	V_{RMS}

[1] Allegro does not conduct 60-second testing. It is done only during the UL certification process.

THERMAL CHARACTERISTICS: May require derating at maximum conditions

Characteristic	Symbol	Test Conditions [2]	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	°C/W

[2] Additional thermal information available on the Allegro website

TYPICAL OVERCURRENT CAPABILITIES [3][4]

Characteristic	Symbol	Notes	Rating	Unit
Overcurrent	I_{POC}	T_A = 25°C; current is on for 1 second and off for 99 seconds, 100 pulses applied	1200	A
		T_A = 85°C; current is on for 1 second and off for 99 seconds, 100 pulses applied	900	A
		T_A = 150°C; current is on for 1 second and off for 99 seconds, 100 pulses applied	600	A

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

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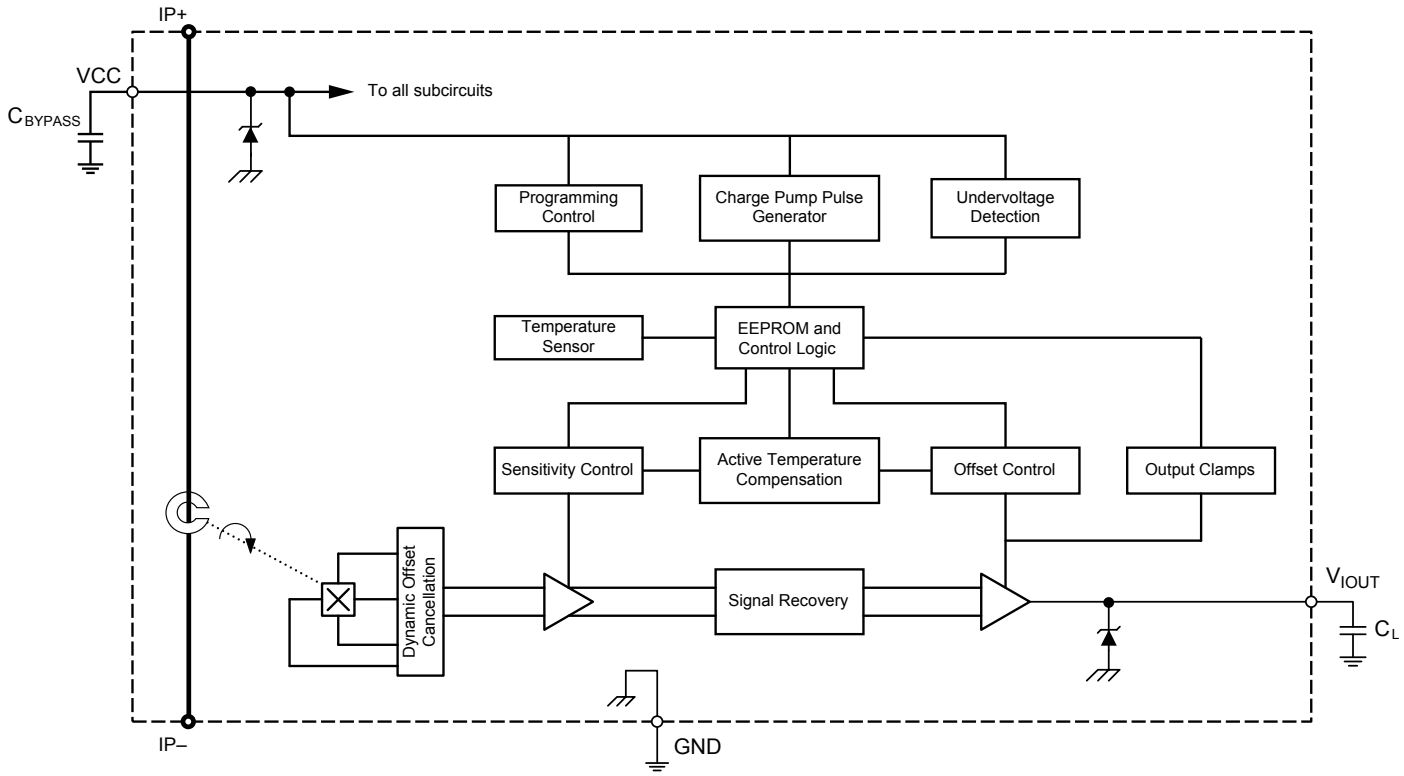
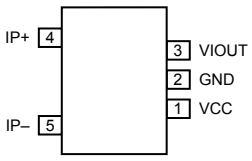


Functional Block Diagram



Pinout 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

COMMON OPERATING CHARACTERISTICS: Valid at T_{OP} = –40°C to 150°C, C_{BYP} = 0.1 µF, and V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
ELECTRICAL CHARACTERISTICS						
Supply Voltage	V_{CC}		4.5	5	5.5	V
Supply Current	I_{CC}	V_{CC} = 5 V, no load on output	–	10	15	mA
Power-On Delay	t_{POD}	T_A = 25°C	–	64	–	µs
Undervoltage Lockout (UVLO) Threshold [1]	V_{UVLOH}	V_{CC} rising at 1 V/ms and device functions enabled	–	4	–	V
	V_{UVLOL}	V_{CC} falling at 1 V/ms and device functions enabled	–	3.5	–	V
UVLO Hysteresis	$V_{HYS(UVLO)}$		250	–	–	mV
UVLO Enable/Disable Delay Time [1]	t_{UVLOE}	Time measured from falling V_{CC} < V_{UVLOH} to UVLO enabled	–	64	–	µs
	t_{UVLOD}	Time measured from rising V_{CC} > V_{UVLOH} to UVLO disabled	–	7	–	µs
Power-On Reset Voltage	V_{PORH}	V_{CC} rising at 1 V/ms	–	2.9	–	V
	V_{PORL}	V_{CC} falling at 1 V/ms	–	2.5	–	V
POR Hysteresis	$V_{HYS(POR)}$		250	–	–	mV
Internal Bandwidth	BW_i	Small signal –3 dB, C_L = 0.47 nF	–	200	–	kHz
Rise Time	t_r	I_P step = 50% of I_P+, 10% to 90% rise time, T_A = 25°C, C_{OUT} = 470 pF	–	2.4	–	µs
Propagation Delay Time	t_{PROP}	T_A = 25°C, C_L = 470 pF, IP step = 50% of IP+	–	1.2	–	µs
Response Time	$t_{RESPONSE}$	T_A = 25°C, C_L = 470 pF, IP step = 50% of IP+, 90% input to 90% output	–	2.5	–	µs
DC Output Impedance	R_{OUT}	T_A = 25°C	–	3.3	–	Ω
Output Load Resistance	$R_{LOAD(MIN)}$	VIOUT to GND, VIOUT to VCC	4.7	–	–	kΩ
Output Load Capacitance	$C_{LOAD(MAX)}$	VIOUT to GND	–	1	10	nF
Primary Conductor Resistance	$R_{PRIMARY}$	T_A = 25°C	–	100	–	µΩ
Output Saturation Voltage	$V_{SAT(HIGH)}$	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
ERROR COMPONENTS						
QVO Ratiometry Error [2]	Rat_{ERRQVO}	V_{CC} = 4.75 to 5.25 V	–	±0.15	–	%
Sens Ratiometry Error [2]	$Rat_{ERRSens}$	V_{CC} = 4.75 to 5.25 V	–	±0.3	–	%
Noise	I_N	Input referenced noise density; T_A = 25°C, C_L = 1 nF	–	0.15	–	mA/√(Hz)
		Input referenced noise at 200 kHz; T_A = 25°C, C_L = 1 nF	–	85	–	mA_{RMS}
Nonlinearity [2]	E_{LIN}	Up to full scale of I_P	–0.9	±0.5	0.9	%
Symmetry [2]	E_{SYM}	Over half-scale I_P	–0.8	±0.4	0.8	%

[1] UVLO feature is only available on part numbers programmed to work at V_{CC} = 5 V.
[2] See Characteristic Definitions section of this datasheet.

X050U PERFORMANCE CHARACTERISTICS: T_A = –40°C to 150°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		0	–	50	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	80 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Unidirectional; I_P = 0 A	–	V_{CC} / 10	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	20.4	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	3.4	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 150°C	–1.25	±0.8	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 150°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	120	250	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 150°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

X050B PERFORMANCE CHARACTERISTICS: T_A = –40°C to 150°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		–50	–	50	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	40 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Bidirectional; I_P = 0 A	–	V_{CC} / 2	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	20.4	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	3.4	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 150°C	–1.25	±0.8	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 150°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	210	250	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 150°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

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X100U PERFORMANCE CHARACTERISTICS: T_A = –40°C to 150°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		0	–	100	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	40 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Unidirectional; I_P = 0 A	–	V_{CC} / 10	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	20.4	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	3.4	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 150°C	–1.25	±0.8	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 150°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	280	400	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 150°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

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XX100B PERFORMANCE CHARACTERISTICS: T_A = –40°C to 150°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		–100	–	100	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	20 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Bidirectional; I_P = 0 A	–	V_{CC} / 2	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	20.4	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	3.4	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 150°C	–1.25	±0.8	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 150°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	175	400	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 150°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 150°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

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X150U PERFORMANCE CHARACTERISTICS: T_A = –40°C to 125°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		0	–	150	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	26.66 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Unidirectional; I_P = 0 A	–	V_{CC} / 10	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	20.4	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	3.4	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 125°C	–1.25	±0.8	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 125°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	280	400	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 125°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 125°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 125°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 125°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

X150B PERFORMANCE CHARACTERISTICS: T_A = –40°C to 125°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		–150	–	150	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	13.33 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Bidirectional; I_P = 0 A	–	V_{CC} / 2	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	7.2	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	1.2	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 125°C	–1.25	±0.8	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 125°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	280	400	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 125°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 125°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 125°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 125°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

XX200U PERFORMANCE CHARACTERISTICS: T_A = –40°C to 85°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		0	–	200	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	20 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Unidirectional; I_P = 0 A	–	V_{CC} / 10	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	7.2	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	1.2	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.7	1	%
		Full scale of I_P, T_{OP} = 25°C to 85°C	–3.5	±1.7	3.5	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–8	±4	8	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 85°C	–20	±6	20	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	160	400	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 85°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

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X200B PERFORMANCE CHARACTERISTICS: T_A = –40°C to 85°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		–200	–	200	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	10 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Bidirectional; I_P = 0 A	–	V_{CC} / 2	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	5.1	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	0.85	–	mV_{RMS}
Sensitivity Error	E_{Sens}	Full scale of I_P, T_A = 25°C	–1	±0.5	1	%
		Full scale of I_P, T_{OP} = 25°C to 85°C	–1.25	±0.7	1.25	%
		Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.5	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 85°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	380	450	mA
Total Output Error	$E_{TOT(HT)}$	Full scale of I_P, T_{OP} = 25°C to 85°C	–1.5	±0.7	1.5	%
	$E_{TOT(LT)}$	Full scale of I_P, T_{OP} = –40°C to 25°C	–3.5	±1.5	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

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X250U PERFORMANCE CHARACTERISTICS: T_A = –40°C to 85°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		0	–	250	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	16 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Unidirectional; I_P = 0 A	–	V_{CC} / 10	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	5.1	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	0.85	–	mV_{RMS}
Sensitivity Error	E_{Sens}	I_P = 200 A, not tested at full scale I_P; T_A = 25°C	–1	±0.7	1	%
		I_P = 200 A, not tested at full scale I_P; T_{OP} = 25°C to 85°C	–1.25	±0.8	1.25	%
		I_P = 200 A, not tested at full scale I_P; T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 85°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	200	400	mA
Total Output Error	$E_{TOT(HT)}$	I_P = 200 A, not tested at full scale I_P; T_{OP} = 25°C to 85°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	I_P = 200 A, not tested at full scale I_P; T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

X250B PERFORMANCE CHARACTERISTICS: T_A = –40°C to 85°C, V_{CC} = 5 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ. [2]	Max.	Unit
NOMINAL PERFORMANCE						
Current Sensing Range [1]	I_{PR}		–250	–	250	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	8 × V_{CC} / 5	–	mV/A
Zero Current Output Voltage	$V_{IOUT(Q)}$	Bidirectional; I_P = 0 A	–	V_{CC} / 2	–	V
ACCURACY PERFORMANCE						
Noise	V_N	T_A = 25°C, C_L = 1 nF	–	5.1	–	mV_{p-p}
		T_A = 25°C, C_L = 1 nF	–	0.85	–	mV_{RMS}
Sensitivity Error	E_{Sens}	I_P = 200 A, not tested at full scale I_P; T_A = 25°C	–1	±0.7	1	%
		I_P = 200 A, not tested at full scale I_P; T_{OP} = 25°C to 85°C	–1.25	±0.8	1.25	%
		I_P = 200 A, not tested at full scale I_P; T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
Electrical Offset Error	$V_{OE(TA)}$	I_P = 0 A, T_A = 25°C	–8	±4	8	mV
	$V_{OE(TOP)HT}$	I_P = 0 A, T_{OP} = 25°C to 85°C	–8	±4	8	mV
	$V_{OE(TOP)LT}$	I_P = 0 A, T_{OP} = –40°C to 25°C	–20	±6	20	mV
Magnetic Offset Error	I_{ERROM}	I_P = 0 A, T_A = 25°C, after excursion of $I_{PR(max)}$	–	175	400	mA
Total Output Error	$E_{TOT(HT)}$	I_P = 200 A, not tested at full scale I_P; T_{OP} = 25°C to 85°C	–1.5	±0.9	1.5	%
	$E_{TOT(LT)}$	I_P = 200 A, not tested at full scale I_P; T_{OP} = –40°C to 25°C	–3.5	±1.7	3.5	%
LIFETIME ACCURACY CHARACTERISTICS [3]						
Sensitivity Error Including Lifetime	$E_{Sens(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.6	2.1	%
	$E_{Sens(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.5	3.5	%
Total Output Error Including Lifetime	$E_{TOT(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–2.1	±1.7	2.1	%
	$E_{TOT(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–3.5	±2.6	3.5	%
Electric Offset Error Including Lifetime	$E_{OFF(LIFE)(HT)}$	T_{OP} = 25°C to 85°C	–10	±7	10	mV
	$E_{OFF(LIFE)(LT)}$	T_{OP} = –40°C to 25°C	–20	±8.9	20	mV

[1] Device may be operated at higher primary current levels, I_P, ambient, T_A, and internal leadframe temperatures, provided that the Maximum Junction Temperature, T_J(max), is not exceeded.
[2] Typical values are ±3 sigma values.
[3] Min/max limits come from AEC-Q100 Grade 1 testing.

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CHARACTERISTIC PERFORMANCE DATA

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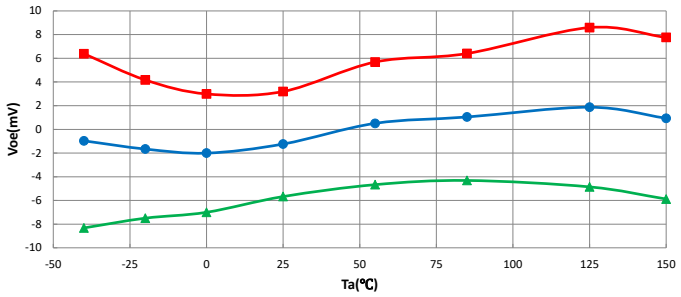
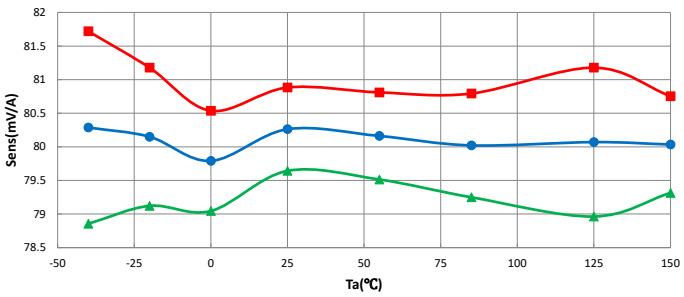
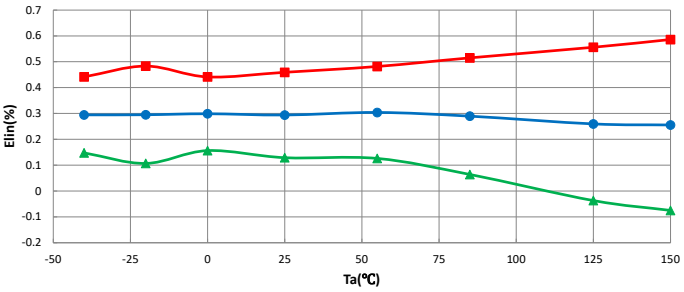
Electrical Offset Voltage versus Ambient Temperature



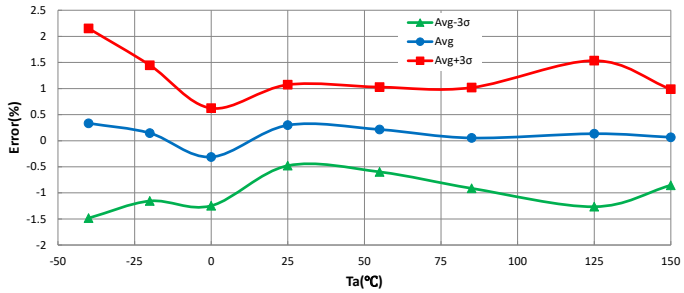
Sensitivity versus Ambient Temperature



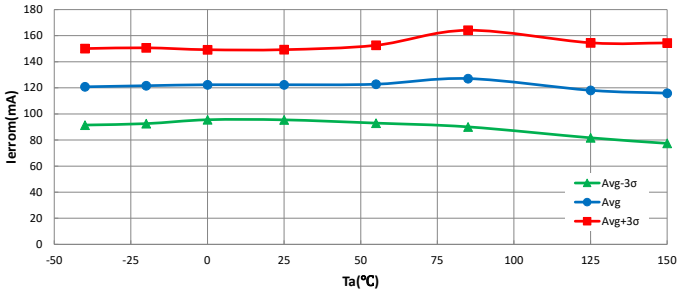
Nonlinearity versus Ambient Temperature

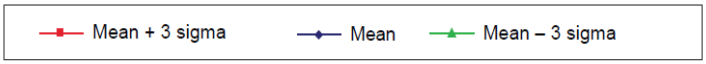


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature





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CHARACTERISTIC PERFORMANCE DATA

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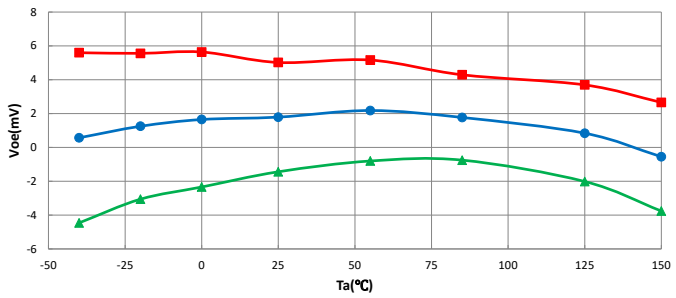
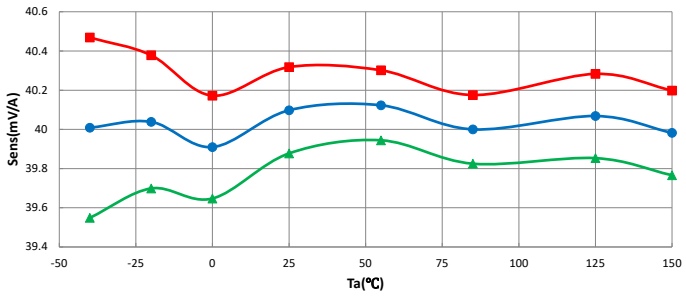
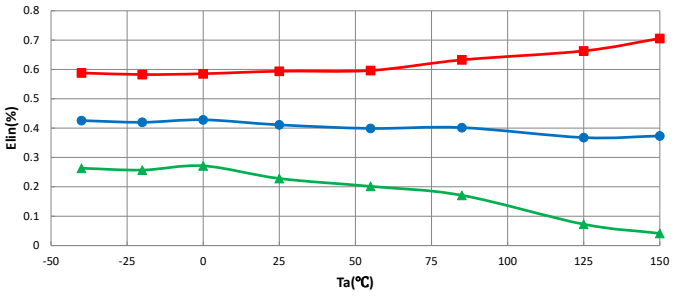
Electrical Offset Voltage versus Ambient Temperature



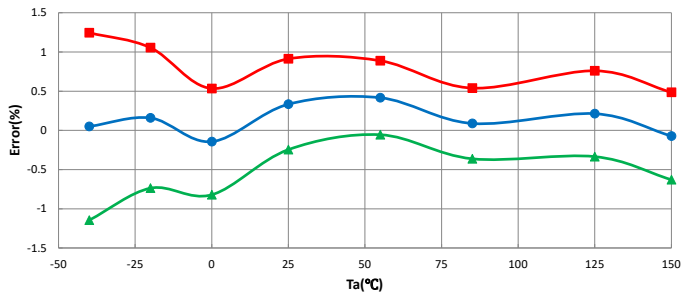
Sensitivity versus Ambient Temperature



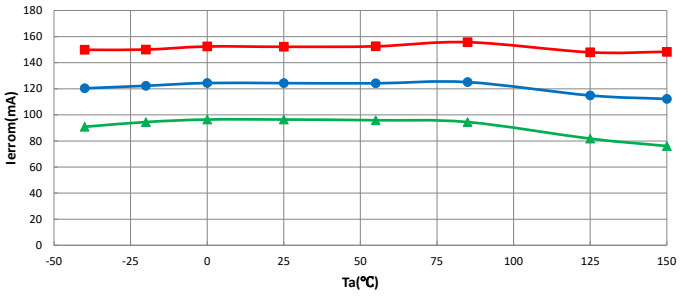
Nonlinearity versus Ambient Temperature

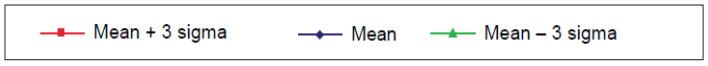


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature





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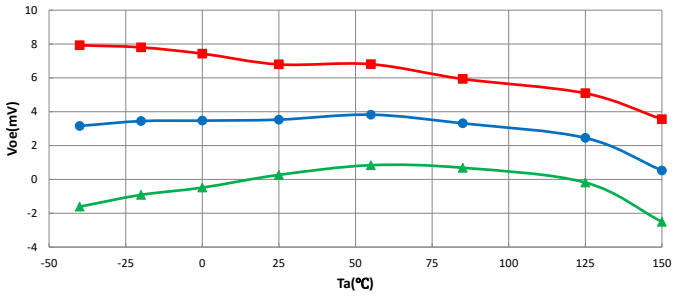
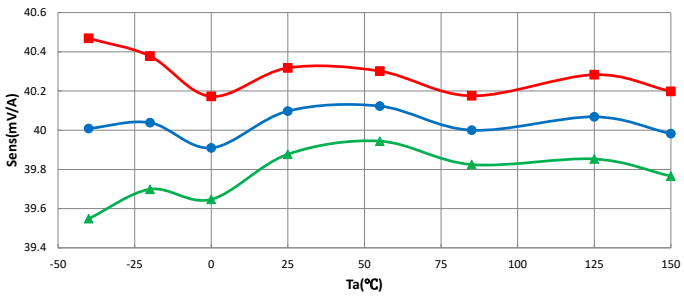
ACS772LCB-100U-PFF-T

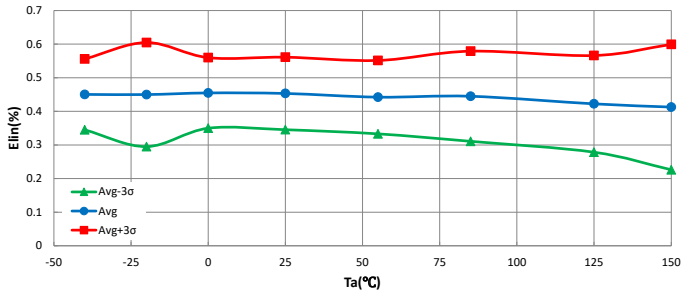
Electrical Offset Voltage versus Ambient Temperature



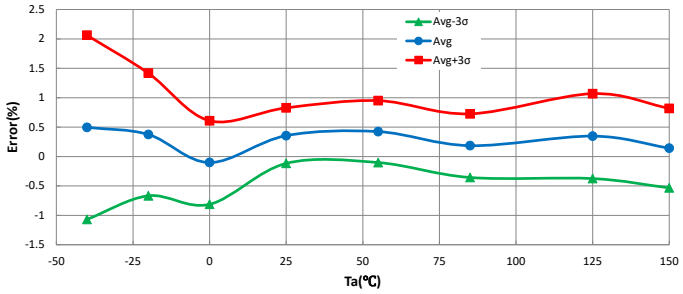
Sensitivity versus Ambient Temperature



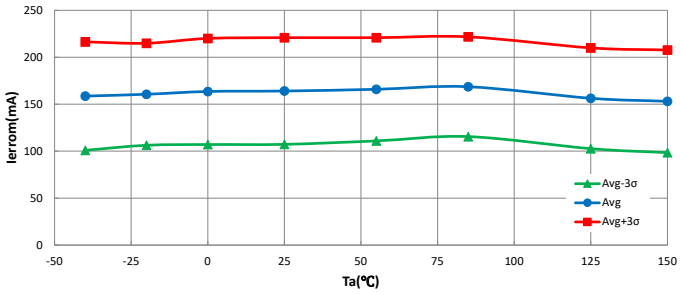
Nonlinearity versus Ambient Temperature

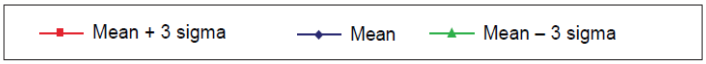


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature

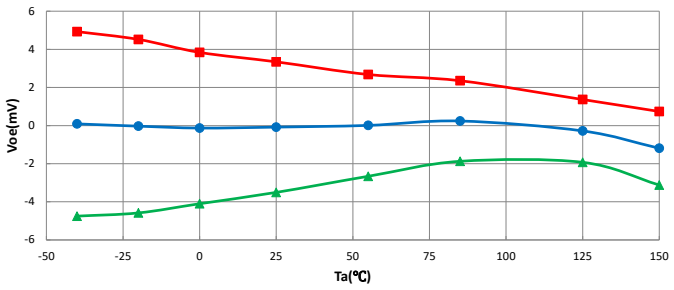




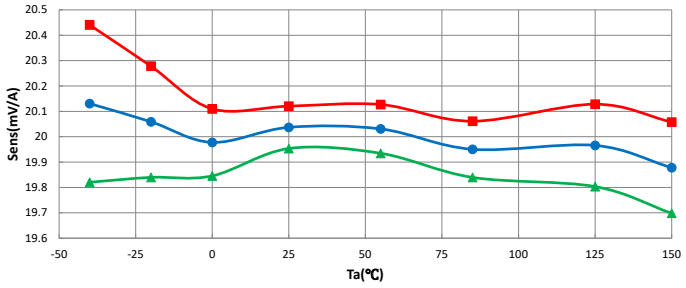
CHARACTERISTIC PERFORMANCE DATA

ACS772LCB-100B-PFF-T

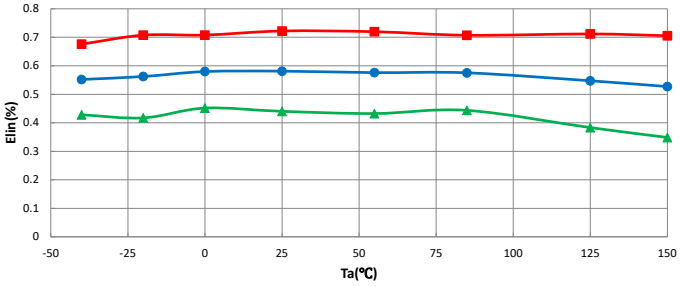
Electrical Offset Voltage versus Ambient Temperature



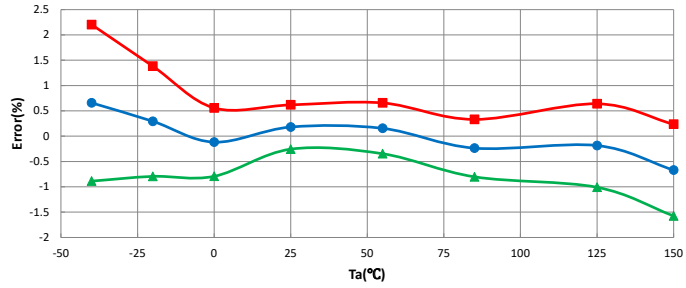
Sensitivity versus Ambient Temperature



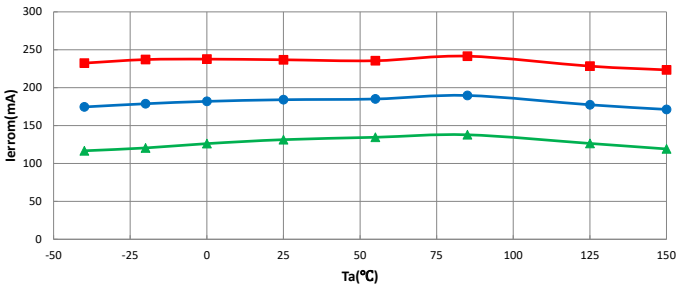
Nonlinearity versus Ambient Temperature

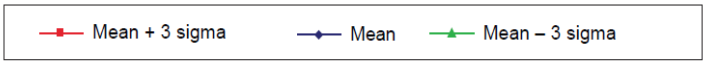


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature





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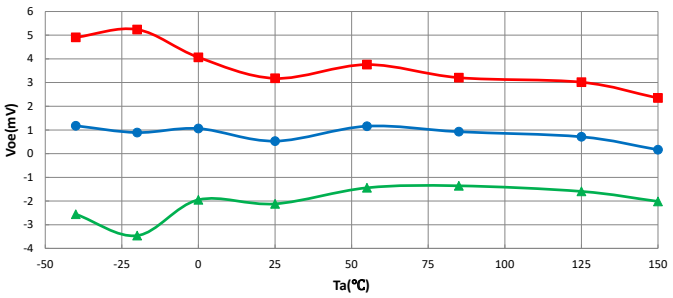
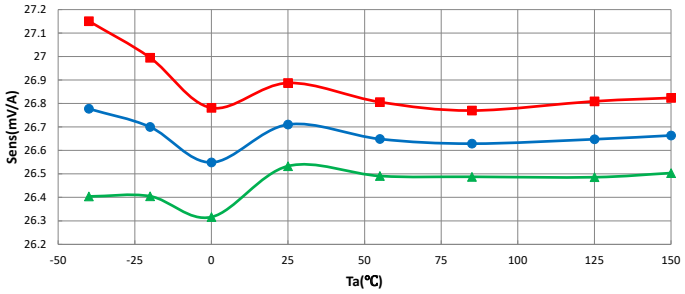
ACS772LCB-150U-PFF-T

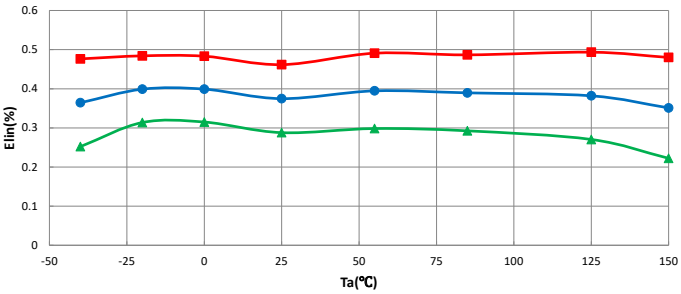
Electrical Offset Voltage versus Ambient Temperature



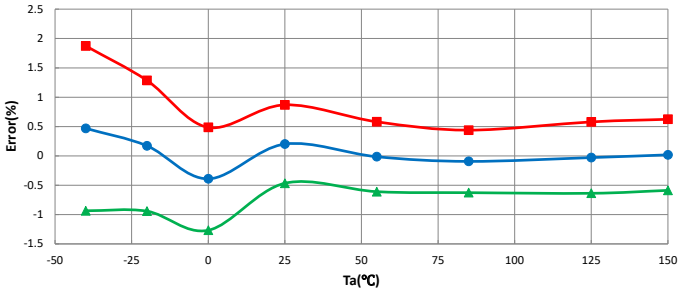
Sensitivity versus Ambient Temperature



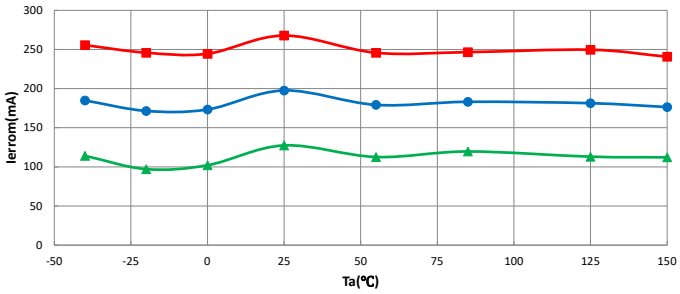
Nonlinearity versus Ambient Temperature

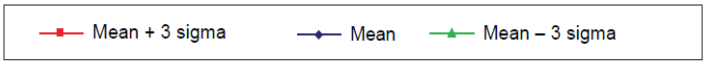


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature





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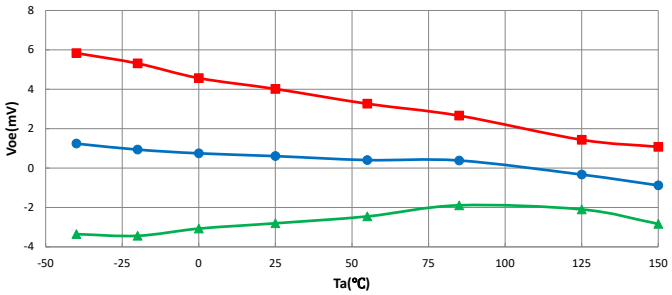
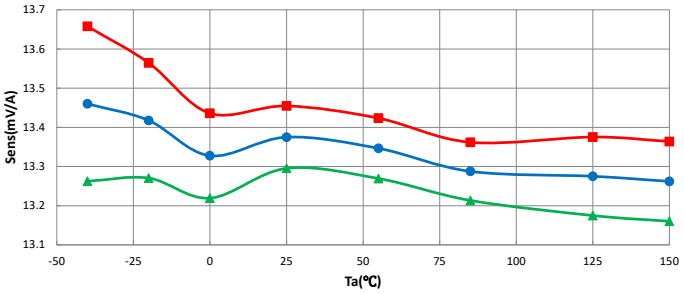
ACS772LCB-150B-PFF-T

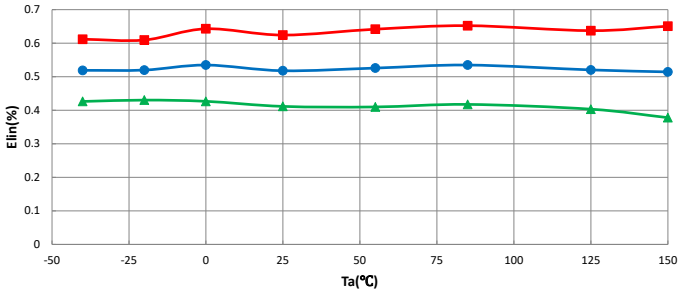
Electrical Offset Voltage versus Ambient Temperature



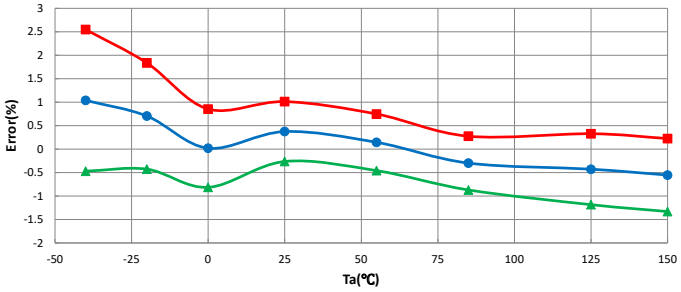
Sensitivity versus Ambient Temperature



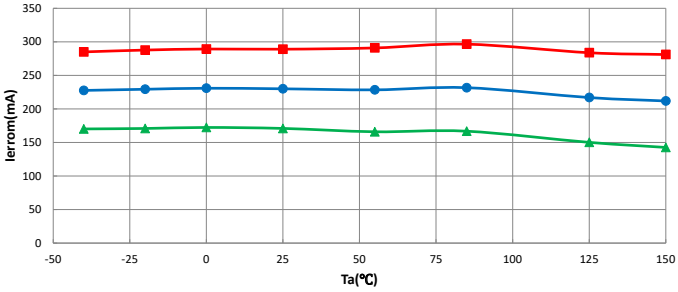
Nonlinearity versus Ambient Temperature

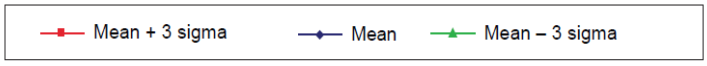


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature





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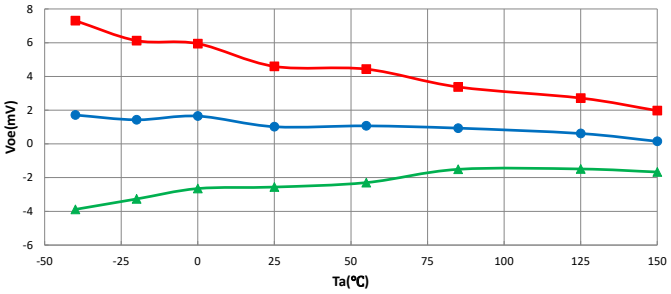
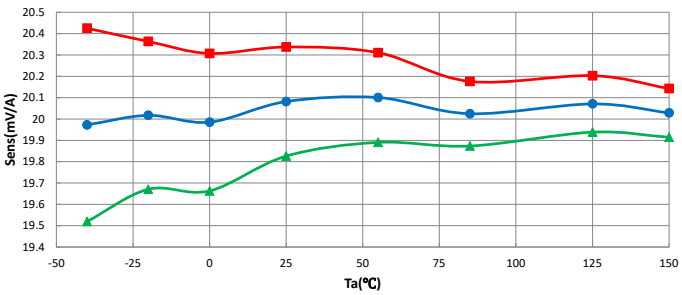
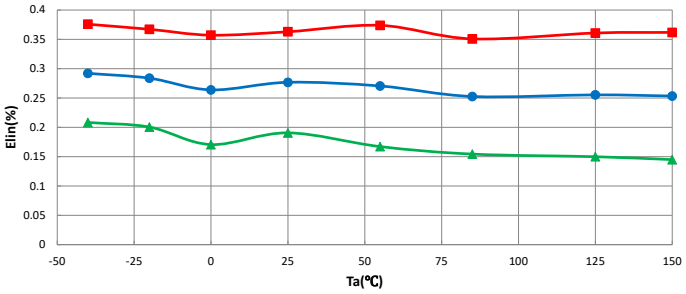
Electrical Offset Voltage versus Ambient Temperature



Sensitivity versus Ambient Temperature



Nonlinearity versus Ambient Temperature



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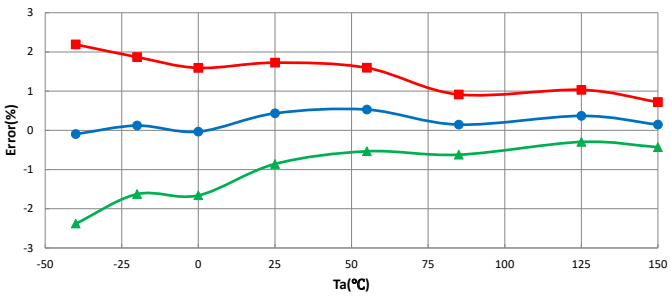
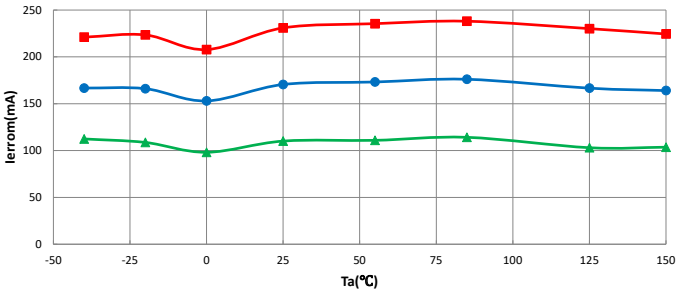
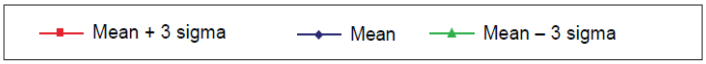


Magnetic Offset Error versus Ambient Temperature





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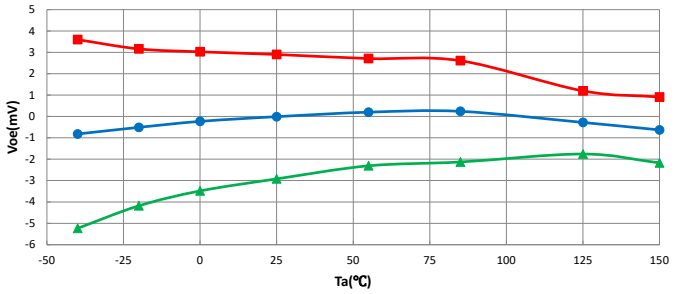
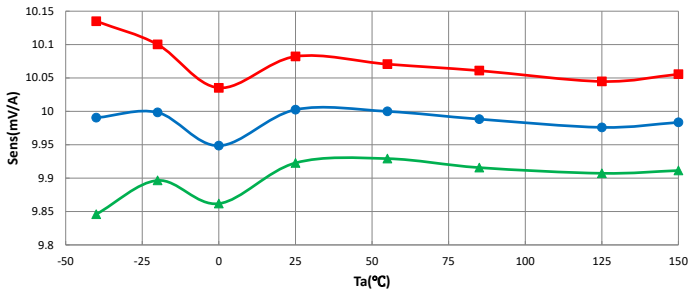
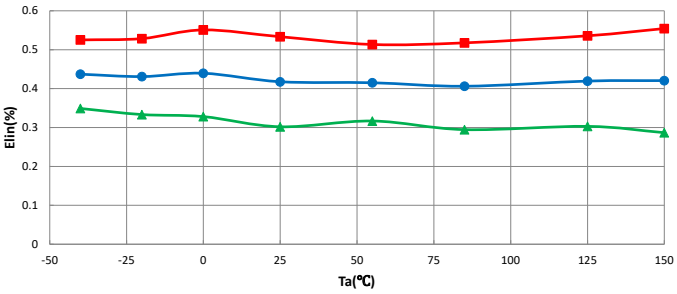
Electrical Offset Voltage versus Ambient Temperature



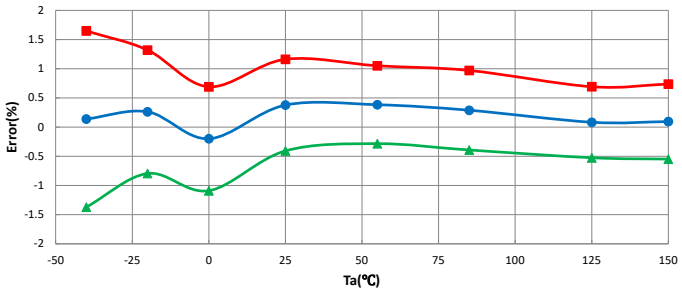
Sensitivity versus Ambient Temperature



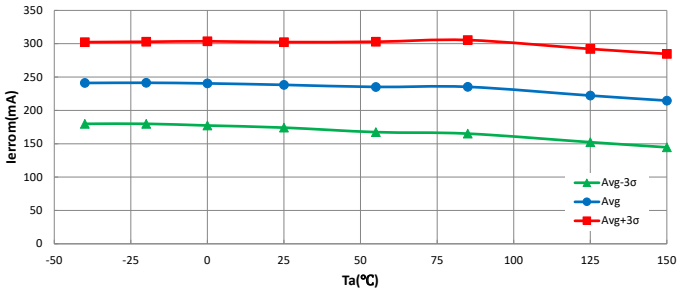
Nonlinearity versus Ambient Temperature

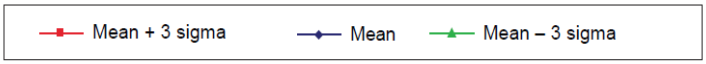


Total Output Error versus Ambient Temperature



Magnetic Offset Error versus Ambient Temperature

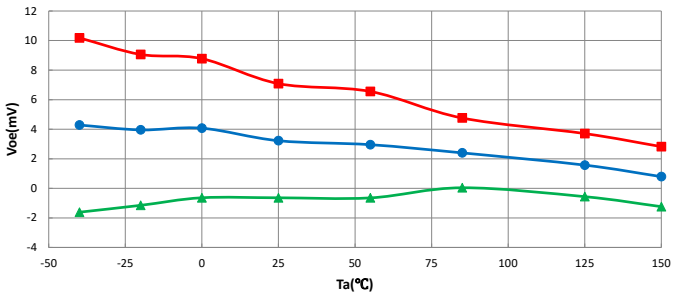




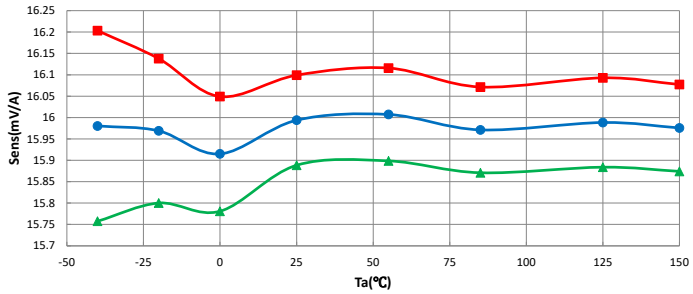
CHARACTERISTIC PERFORMANCE DATA

ACS772LCB-250U-PFF-T

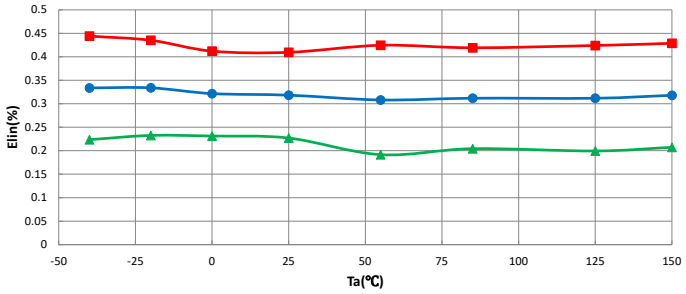
Electrical Offset Voltage versus Ambient Temperature



Sensitivity versus Ambient Temperature



Nonlinearity versus Ambient Temperature



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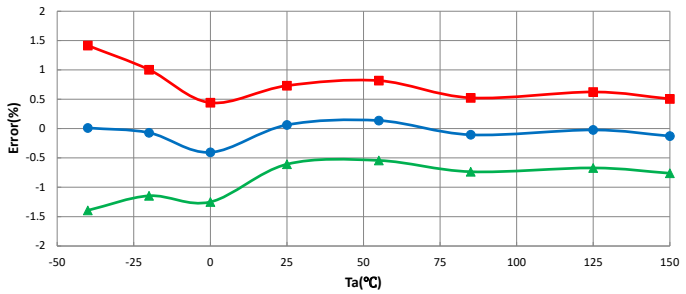
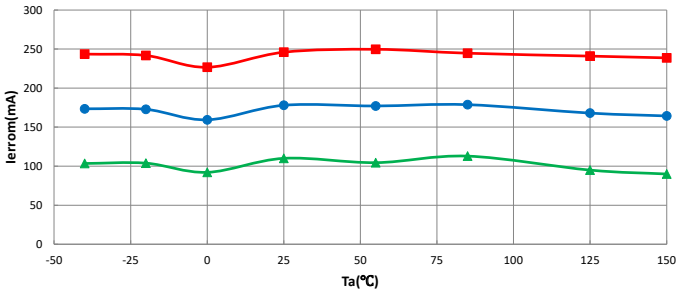
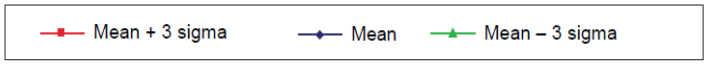


Magnetic Offset Error versus Ambient Temperature

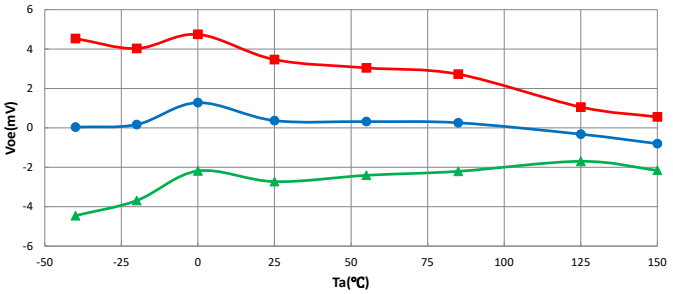




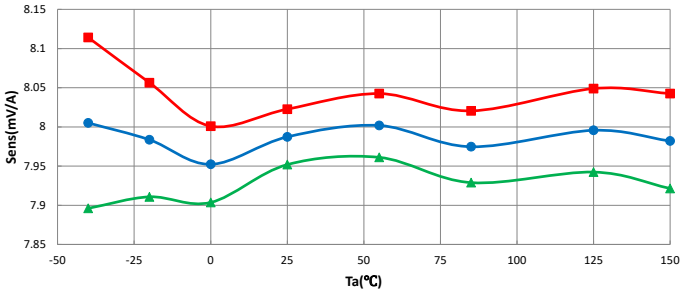
CHARACTERISTIC PERFORMANCE DATA

ACS772LCB-250B-PFF-T

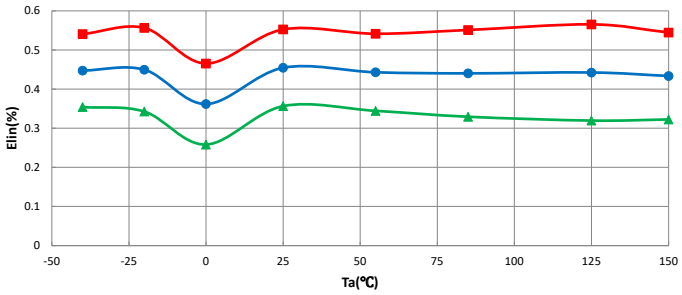
Electrical Offset Voltage versus Ambient Temperature



Sensitivity versus Ambient Temperature



Nonlinearity versus Ambient Temperature



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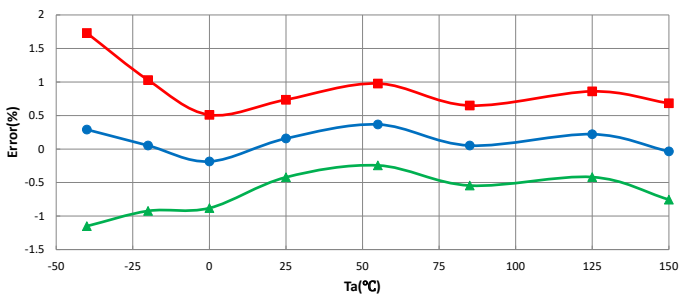

Magnetic Offset Error versus Ambient Temperature