ACS37030 and ACS37032

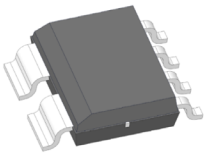
DC to 5 MHz Bandwidth, Galvanically Isolated, High-Accuracy Current Sensor IC with Reference Output (ACS37030) or Fault (ACS37032)

FEATURES AND BENEFITS

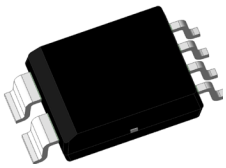
- High operating bandwidth for fast control loops or where high-speed switching currents are monitored
  - DC to 5 MHz bandwidth
  - 40 ns typical response time
- High accuracy and low noise
  - ±2% sensitivity error over temperature
  - ±10 mV maximum offset voltage over temperature
  - 50 mA_{RMS} input referred noise
  - 3.3 V non-ratiometric supply operation
  - Differential sensing immune to external magnetic fields
- VREF output voltage for differential routing in noisy application environments (ACS37030)
- FAULT output for fast open drain overcurrent detection (ACS37032)
- UL-certified, highly isolated compact surface-mount packages
- Available in the 6-pin fused-lead SOIC (suffix LZ) package (4 mm creepage) and the 6-pin fused-lead wide-body SOIC (suffix MY) package (8 mm creepage)
- Wide operating temperature, –40°C to 150°C
- Grade 0, AEC-Q100 automotive qualified

PACKAGE

Not to Scale



6-Pin Fused-Lead SOIC (suffix LZ)



6-Pin Fused-Lead Wide-Body SOIC (suffix MY)

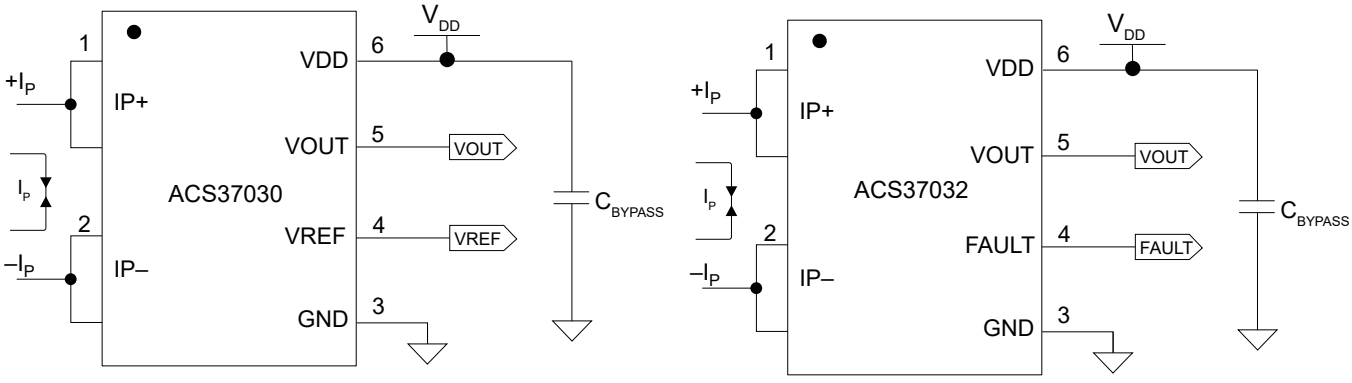
DESCRIPTION

The ACS37030/2 is a fully integrated current sensor IC that senses current flowing through the primary conductor. Two signal paths are used: a Hall-effect element path to capture DC and low-frequency current information, and an inductive coil path to capture high-frequency current information. These two paths are summed to allow for sensing of a wide frequency band with a single device. The properties of the coil increase SNR as frequency increases, minimizing noise at the output.

The internal construction provides high isolation by magnetically coupling the field generated by current flow in the conductor to the fully monolithic Hall and coil IC. The current is sensed differentially by two Hall plates and two coils that subtract interfering common-mode magnetic fields. The IC does not have a physical connection to the integrated current conductor and provides a 3500 V_{RMS} (LZ package) and 4242 V_{RMS} (MY package) isolation voltage between the primary signal leads. These high ratings provide a basic working voltage of 905 V_{RMS} (LZ package) and 1000 V_{RMS} (MY package) isolation voltage between the primary and secondary signal leads of the package.

Both zero-current reference (ACS37030) and overcurrent fault with internal pull-up (ACS37032) options are available.

The ACS37030/32 is provided in one of two six-lead custom SOIC surface-mount packages; these packages are low resistance, <1 mΩ with fused-lead current conductors. The LZ package has a resistance of 0.6 mΩ with a creepage/clearance of 4.1 mm, while the MY package has a resistance of 0.9 mΩ with a creepage/clearance of 8.5 mm. 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 Pb-free.



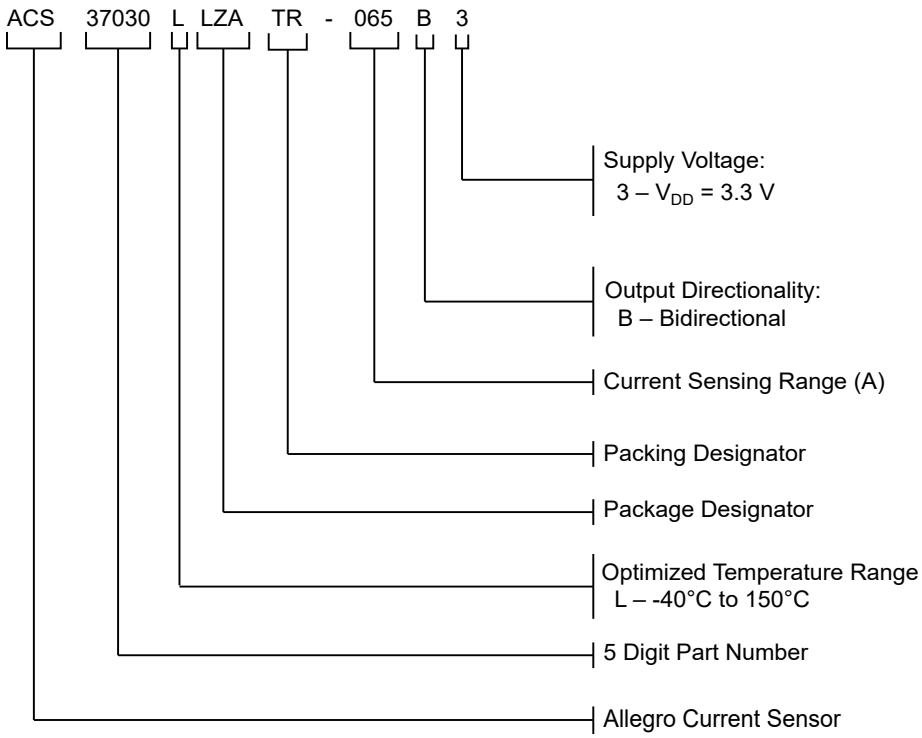
The device outputs an analog signal, V_{OUT}, that varies linearly with the bidirectional AC or DC primary current, I_P, within the ranges specified.

Figure 1: Typical Application Circuit

SELECTION GUIDE

Part Number	Current Sensing Range, I_{PR} (A)	Sensitivity (mV/A)	V_{DD} (V)	V_{QVO} (V)	Feature	Optimized Temperature Range T_A (°C)	Packing
LZ Package							
ACS37030LLZATR-020B3	±20	66	3.3	1.65	VREF	–40 to 150	Tape and reel, 3000 pieces per reel
ACS37030LLZATR-040B3	±40	33					
ACS37030LLZATR-065B3	±65	20.3					
ACS37032LLZATR-020B3	±20	66			FAULT		
ACS37032LLZATR-040B3	±40	33					
ACS37032LLZATR-065B3	±65	20.3					
MY Package (Wide Body)							
ACS37030LMYATR-025B3	±25	52.8	3.3	1.65	VREF	–40 to 150	Tape and reel, 1000 pieces per reel
ACS37030LMYATR-040B3	±40	33					
ACS37030LMYATR-065B3	±65	20.3					
ACS37032LMYATR-025B3	±25	52.8			FAULT		
ACS37032LMYATR-040B3	±40	33					
ACS37032LMYATR-065B3	±65	20.3					

PART NAMING SPECIFICATION



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ABSOLUTE MAXIMUM RATINGS [1]

Characteristic	Symbol	Notes	Rating	Unit
Supply Voltage	V_{DD}		–0.5 to 4	V
Forward Output Voltage	V_O	Applies to V_{OUT}, V_{REF}, and FAULT	–0.5 to V_{DD} + 0.5 (< 3.8)	V
Operating Ambient Temperature	T_A	L temperature range	–40 to 150	°C
Storage Temperature	T_{stg}		–65 to 165	°C
Maximum Junction Temperature	T_{JMAX}	Sensing range of sensor is limited by T_{JMAX} = 165°C	165	°C

[1] Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

LZ PACKAGE ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Value	Units
Withstand Strength [1][2]	V_{ISO}	Agency rated for 60 seconds per UL 62368-1 (edition 3)	3500	V_{RMS}
Working Voltage for Basic Isolation [2]	V_{WVBI}	Maximum approved working voltage for basic (single) isolation according to UL 62368-1 (edition 3)	1188	V_{PK} or V_{DC}
			840	V_{RMS}
Working Voltage for Reinforced Isolation [2]	V_{WVRI}	Maximum approved working voltage for reinforced isolation according to UL 62368-1 (edition 3)	594	V_{PK} or V_{DC}
			420	V_{RMS}
Surge Voltage	V_{SURGE}	1.2/50 µs waveform, tested in dielectric fluid to determine the intrinsic surge immunity of the isolation barrier	13000	V_{PK}
Impulse Withstand	$V_{IMPULSE}$	1.2/50µs waveform, tested in air	5000	V_{RMS}
Clearance	D_{CL}	Minimum distance through air from IP leads to signal leads	4.1	mm
Creepage	D_{CR}	Minimum distance along package body from IP leads to signal leads	4.1	mm
Distance Through Insulation	DTI	Minimum internal distance through insulation	54	µm
Comparative Tracking Index	CTI	Material Group I	>600	V

[1] Production tested in accordance UL 62368-1 (edition 3).
[2] Certification pending.

MY PACKAGE ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Value	Units
Withstand Strength [1][2]	V_{ISO}	Agency rated for 60 seconds per UL 62368-1 (edition 3)	4242	V_{RMS}
Working Voltage for Basic Isolation [2]	V_{WVBI}	Maximum approved working voltage for basic (single) isolation according to UL 62368-1 (edition 3)	1414	V_{PK} or V_{DC}
			1000	V_{RMS}
Working Voltage for Reinforced Isolation [2]	V_{WVRI}	Maximum approved working voltage for reinforced isolation according to UL 62368-1 (edition 3)	707	V_{PK} or V_{DC}
			500	V_{RMS}
Surge Voltage	V_{SURGE}	1.2/50 µs waveform, tested in dielectric fluid to determine the intrinsic surge immunity of the isolation barrier	10000	V_{PK}
Impulse Withstand	$V_{IMPULSE}$	1.2/50 µs waveform, tested in air	6000	V_{RMS}
Clearance	D_{CL}	Minimum distance through air from IP leads to signal leads	8.5	mm
Creepage	D_{CR}	Minimum distance along package body from IP leads to signal leads	8.5	mm
Distance Through Insulation	DTI	Minimum internal distance through insulation	54	µm
Comparative Tracking Index	CTI	Material Group II	400 to 599	V

[1] Production tested in accordance UL 62368-1 (edition 3).
[2] Certification pending.

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THERMAL CHARACTERISTICS

Characteristic	Symbol	Notes	Value	Unit
Package Thermal Resistance (Junction to Ambient)	$R_{\theta JA}$	LZ package; mounted on the standard LZ Current Sensor Evaluation Board (ACSEVB-LC8-LZ6)	16	°C/W
		MY package; mounted on the standard MY Current Sensor Evaluation Board (ACSEVB-MZ6-MY6)	17	°C/W
Package Thermal Metric (Junction to Top)	Ψ_{JT}	LZ package; mounted on the standard LZ Current Sensor Evaluation Board (ACSEVB-LC8-LZ6)	0	°C/W
		MY package; mounted on the standard MY Current Sensor Evaluation Board (ACSEVB-MZ6-MY6)	–3	°C/W
Package Thermal Resistance (Junction to Case)	$R_{\theta JC}$	LZ package; simulated per the methods in JESD51-1	23	°C/W
		MY package; simulated per the methods in JESD51-1	26	°C/W
Package Thermal Resistance (Junction to Board)	$R_{\theta JB}$	LZ package; simulated per the methods in JESD51-8	12	°C/W
		MY package; simulated per the methods in JESD51-8	7	°C/W

PACKAGE CHARACTERISTICS

Characteristic	Symbol	Notes	Min.	Typ.	Max.	Unit
Internal Conductor Resistance	R_{IC}	T_A = 25°C, LZ	–	0.68	–	mΩ
		T_A = 25°C, MY	–	0.9	–	mΩ
Internal Conductor Inductance	L_{IC}	T_A = 25°C, LZ	–	2.2	–	nH
		T_A = 25°C, MY	–	4.4	–	nH
Moisture Sensitivity Level	MSL	Per IPC/JEDEC J-STD-020	–	2	–	–

PINOUT DIAGRAM AND TERMINAL LIST TABLE

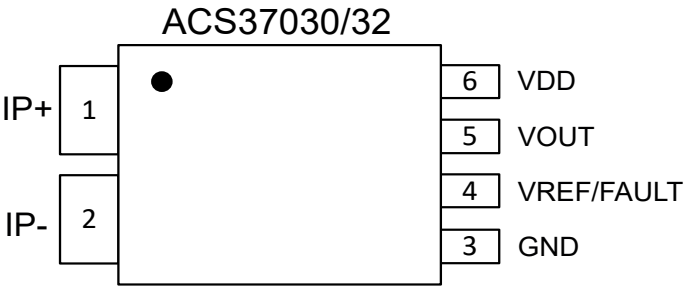

Figure 2: Package Pinout Diagram

Terminal List

Number	Name	Description
1	IP+	Positive terminal for current being sensed
2	IP–	Negative terminal for current being sensed
3	GND	Device ground terminal
4	VREF/FAULT	Reference or overcurrent fault output
5	VOUT	Analog output signal
6	VDD	Device power supply terminal

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FUNCTIONAL BLOCK DIAGRAM

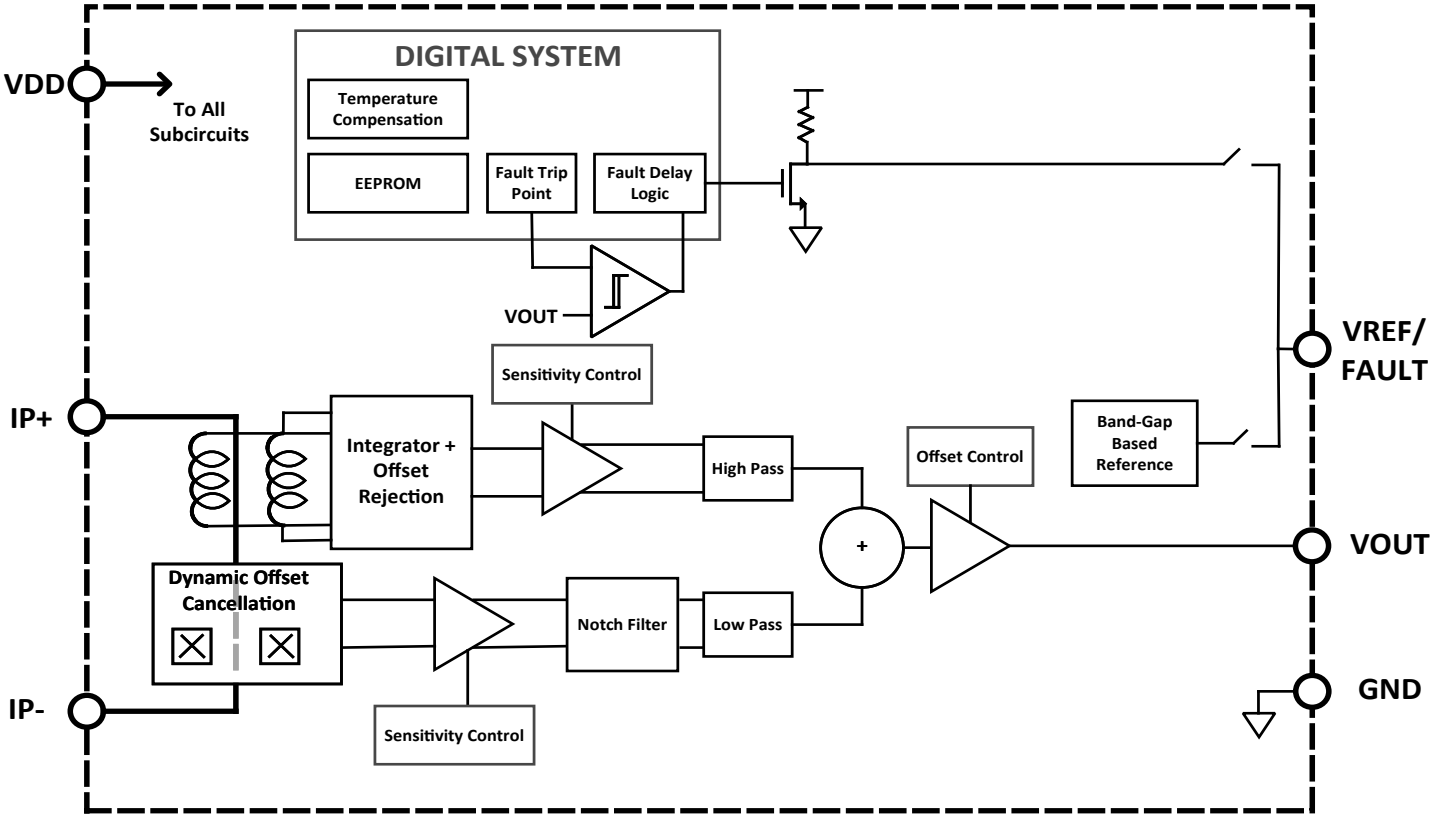

Figure 3: Functional Block Diagram

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COMMON ELECTRICAL CHARACTERISTICS: Valid through full operating temperature range, T_A = –40°C to 150°C, C_{BYPASS} = 0.1 µF, and V_{DD} = 3.3 V, unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Supply Voltage	V_{DD}		3	3.3	3.6	V
Supply Current	I_{DD}	Load not present on V_{OUT} or V_{REF}	–	20	30	mA
Supply Bypass Capacitor [1]	C_{BYPASS}		0.1	–	–	µF
Output Resistive Load [1]	R_{L_VOUT}		50	–	–	kΩ
Output Capacitive Load	C_{L_VOUT}		–	–	100	pF
Power-On Reset Voltage	V_{POR}	T_A = 25°C, V_{DD} rising 1 V/ms	2.6	2.9	3	V
POR Hysteresis	V_{POR_HYS}		200	250	–	mV
Power-On Time	t_{PO}		–	2	4	ms
OUTPUT SIGNAL CHARACTERISTICS (VOUT)						
Saturation Voltage [2]	V_{SAT_H}	R_L = 50 kΩ to GND	3	–	–	V
	V_{SAT_L}	R_L = 50 kΩ to V_{DD}	–	–	0.15	V
VOUT Short Circuit Current	I_{SC_VOUT}	T_A = 25°C, VOUT to GND	–	25	–	mA
Bandwidth	BW	Small signal –3 dB, C_{L_VOUT} = 100 pF	–	5	–	MHz
Rise Time	t_R	T_A = 25°C, C_{L_VOUT} = 100 pF	–	40	–	ns
Response Time	t_{RESP}	T_A = 25°C, C_{L_VOUT} = 100 pF	–	40	–	ns
Propagation Delay	t_{PD}	T_A = 25°C, C_{L_VOUT} = 100 pF	–	30	–	ns
Noise	I_N	BW = 5 MHz, T_A = 25°C, C_{L_VOUT} = 100 pF	–	50	–	mA_{RMS}
Common-Mode Field Rejection	CMFR	Input-referred error due to a common-mode field	–	1.6	–	mA/G
REFERENCE OUTPUT CHARACTERISTICS (VREF, ACS37030 only)						
Reference Resistive Load	R_{L_VREF}		50	–	–	kΩ
Reference Capacitive Load	C_{L_VREF}		–	–	100	pF
Reference Source/Sink Current Limit	I_{REF}	Maximum current V_{REF} can passively source	–	25	–	mA
FAULT OUTPUT CHARACTERISTICS (FAULT, ACS37032 only)						
Overcurrent Operating Range	I_{OCR}		90	100	110	%
Internal Overcurrent FAULT Pull-Up Resistance	R_{L_IFAULT}		–	10	–	kΩ
Overcurrent FAULT Error	E_{OC}	T_A = 25°C	–10	–	10	$\%I_{OCR}$ [3]
Overcurrent FAULT Output Low Voltage	V_{FAULT_L}	R_{L_FAULT} = 50 kΩ, fault condition present	–	0.1	0.4	V
Overcurrent FAULT Leakage Current	I_{FAULT_OFF}	R_{L_FAULT} = 50 kΩ, fault condition not present	–	100	500	nA
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	6	10	$\%I_{PR}$
Overcurrent Response Time [2]	t_{OC_RESP}		–	150	–	ns

[1] Validated by design and characterization.
[2] The sensor might continue to respond to current beyond the specified current sensing range, I_{PR}, until the output saturates at the high or low saturation voltage; however, beyond the specified current sensing range, the linearity and performance are not validated.
[3] Where I_{OCR} is the specific point at which the overcurrent FAULT triggerl occurs.

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–20	–	20	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	66	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Reference Voltage Output	V_{REF}		–	1.65	–	V
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Offset Error	V_{OE}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Reference Voltage Output Error	V_{REF_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–3.5	–	3.5	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–3.75	–	3.75	%
Offset Error Including Lifetime Drift	V_{OE_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV
Reference Voltage Error Including Lifetime Drift	V_{REF_LT}	T_A = –40°C to 150°C	–10	–	10	mV
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV

[1] Absolute minimum (Min. or min) and absolute maximum (Max. or max) are the production limits that the device must not exceed.
[2] Validated by design and characterization
[3] Lifetime drift minimum/maximum values are ±3 sigma, and are based on a statistical combination of production distributions and worst-case drift distributions observed after AEC-Q100 qualification stresses.

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–40	–	40	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	33	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Reference Voltage Output	V_{REF}		–	1.65	–	V
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Offset Error	V_{OE}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Reference Voltage Output Error	V_{REF_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–3.5	–	3.5	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–3.75	–	3.75	%
Offset Error Including Lifetime Drift	V_{OE_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV
Reference Voltage Error Including Lifetime Drift	V_{REF_LT}	T_A = –40°C to 150°C	–10	–	10	mV
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–65	–	65	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	20.3	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Reference Voltage Output	V_{REF}		–	1.65	–	V
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Offset Error	V_{OE}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Reference Voltage Output Error	V_{REF_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–3.5	–	3.5	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–3.75	–	3.75	%
Offset Error Including Lifetime Drift	V_{OE_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV
Reference Voltage Error Including Lifetime Drift	V_{REF_LT}	T_A = –40°C to 150°C	–10	–	10	mV
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV

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[3] Lifetime drift minimum/maximum values are ±3 sigma, and are based on a statistical combination of production distributions and worst-case drift distributions observed after AEC-Q100 qualification stresses.

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–20	–	20	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	66	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Overcurrent FAULT Threshold	I_{OC}		–	100	–	$\%I_{PR}$
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	1.2	–	A
FAULT ERROR						
Overcurrent Fault Error	I_{OC_E}		–2	–	2	A
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–3.5	–	3.5	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–3.75	–	3.75	%
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–40	–	40	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	33	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Overcurrent FAULT Threshold	I_{OC}		–	100	–	$\%I_{PR}$
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	2.4	–	A
FAULT ERROR						
Overcurrent Fault Error	I_{OC_E}		–4	–	4	A
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–3.5	–	3.5	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–3.75	–	3.75	%
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–10	–	10	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range	I_{PR}		–65	–	65	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	20.3	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Overcurrent FAULT Threshold	I_{OC}		–	100	–	$\%I_{PR}$
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	3.9	–	A
FAULT ERROR						
Overcurrent Fault Error	I_{OC_E}		–6.5	–	6.5	A
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	I_P= 40 A, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P= 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	I_P = 40 A, DC	–3.5	–	3.5	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–3.75	–	3.75	%
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = 25°C to 150°C	–10	–	10	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–25	–	25	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	52.8	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Reference Voltage Output	V_{REF}		–	1.65	–	V
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Offset Error	V_{OE}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Reference Voltage Output Error	V_{REF_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–	±1.6	–	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–	±1	–	%
Offset Error Including Lifetime Drift	V_{OE_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±0.35	–	mV
Reference Voltage Error Including Lifetime Drift	V_{REF_LT}	T_A = –40°C to 150°C	–	±1	–	mV
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±1.65	–	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–40	–	40	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	33	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Reference Voltage Output	V_{REF}		–	1.65	–	V
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Offset Error	V_{OE}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Reference Voltage Output Error	V_{REF_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–	±1.6	–	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–	±1	–	%
Offset Error Including Lifetime Drift	V_{OE_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±0.35	–	mV
Reference Voltage Error Including Lifetime Drift	V_{REF_LT}	T_A = –40°C to 150°C	–	±1	–	mV
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±1.65	–	mV

[1] Absolute minimum (Min. or min) and absolute maximum (Max. or max) are the production limits that the device must not exceed.
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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–65	–	65	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	20.3	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Reference Voltage Output	V_{REF}		–	1.65	–	V
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Offset Error	V_{OE}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Reference Voltage Output Error	V_{REF_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–	±1.6	–	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–	±1	–	%
Offset Error Including Lifetime Drift	V_{OE_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±0.35	–	mV
Reference Voltage Error Including Lifetime Drift	V_{REF_LT}	T_A = –40°C to 150°C	–	±1	–	mV
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±1.65	–	mV

[1] Absolute minimum (Min. or min) and absolute maximum (Max. or max) are the production limits that the device must not exceed.
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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–25	–	25	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	52.8	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Overcurrent FAULT Threshold	I_{OC}		–	100	–	$\%I_{PR}$
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	1.2	–	A
FAULT ERROR						
Overcurrent Fault Error	I_{OC_E}		–2	–	2	A
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–	±1.6	–	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–	±1	–	%
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±1.65	–	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range [2]	I_{PR}	Limited by T_{JMAX} = 165°C	–40	–	40	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	33	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Overcurrent FAULT Threshold	I_{OC}		–	100	–	$\%I_{PR}$
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	2.4	–	A
FAULT ERROR						
Overcurrent Fault Error	I_{OC_E}		–4	–	4	A
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	$I_P = I_{PR(max)}$, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P = 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	$I_P = I_{PR(max)}$, DC	–	±1.6	–	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–	±1	–	%
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = –40°C to 150°C	–	±1.65	–	mV

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Characteristic	Symbol	Test Conditions	Min. [1]	Typ.	Max. [1]	Units
NOMINAL PERFORMANCE						
Current Sensing Range	I_{PR}		–65	–	65	A
Sensitivity	Sens	$I_{PR(min)} < I_P < I_{PR(max)}$	–	20.3	–	mV/A
Quiescent Voltage Output	V_{QVO}	I_P = 0 A	–	1.65	–	V
Overcurrent FAULT Threshold	I_{OC}		–	100	–	%I_{PR}
Overcurrent FAULT Hysteresis	I_{OC_HYS}		–	3.9	–	A
FAULT ERROR						
Overcurrent Fault Error	I_{OC_E}		–6.5	–	6.5	A
ERROR COMPONENTS						
Sensitivity Error	E_{SENS}	I_P= 40 A, T_A = –40°C to 150°C, DC	–2	±1	2	%
		I_P= 7 A, T_A = –40°C to 150°C, 500 kHz	–	±2	–	%
Quiescent Voltage Output Error	V_{QVO_E}	I_P = 0 A, T_A = –40°C to 150°C	–10	±5	10	mV
Power Supply Offset Error	V_{OE_PS}	$V_{DD(min)}$ to $V_{DD(max)}$	–5	±3	5	mV
Power Supply Sensitivity Error	E_{SENS_PS}	$V_{DD(min.)}$ to $V_{DD(max)}$	–1.5	±1	1.5	%
ERROR INCLUDING LIFETIME DRIFT [2][3]						
Hall Path Sensitivity Error Including Lifetime Drift	$E_{SENS_H_LT}$	I_P = 40 A, DC	–	±1.6	–	%
Coil Path Sensitivity Error Including Lifetime Drift	$E_{SENS_C_LT}$	I_P = 7 A, AC	–	±1	–	%
Quiescent Voltage Error Including Lifetime Drift	V_{QVO_LT}	I_P = 0 A, T_A = 25°C to 150°C	–	±1.65	–	mV

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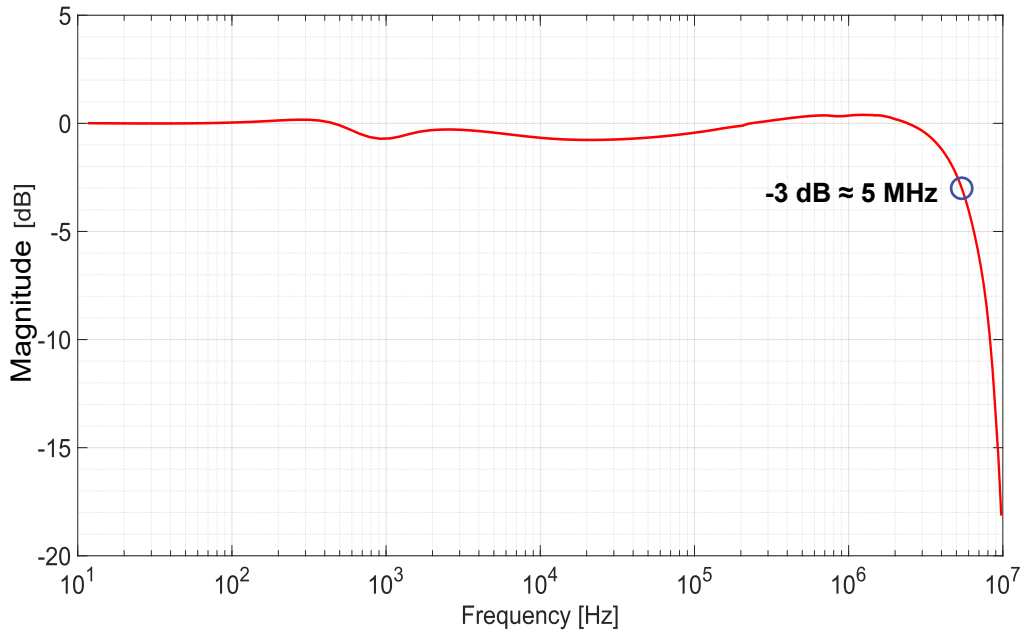
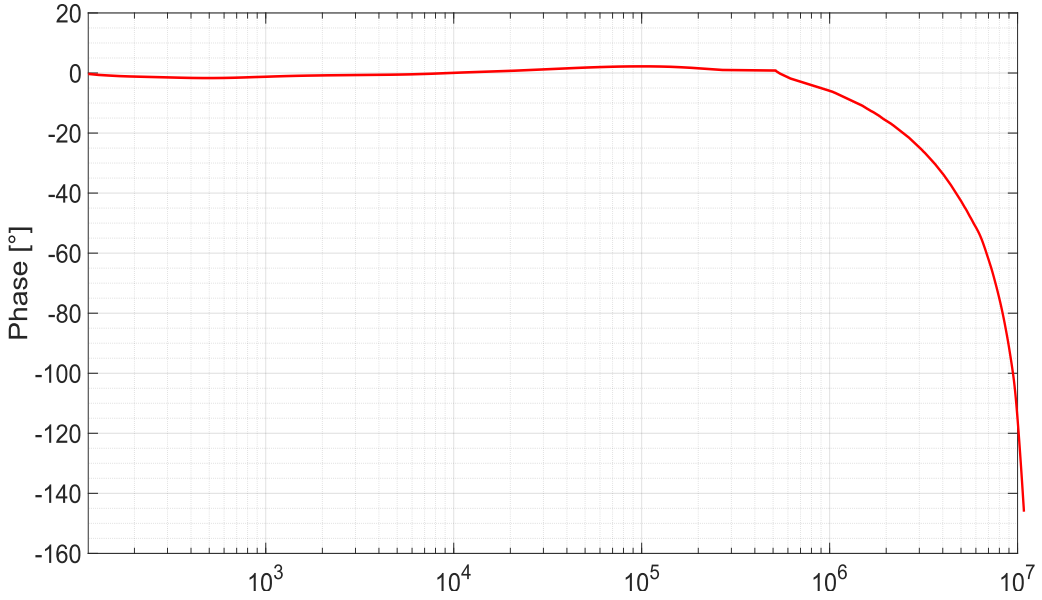
ACS37030/2 TYPICAL FREQUENCY RESPONSE





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RESPONSE CHARACTERISTICS DEFINITIONS AND PERFORMANCE DATA

Response Time (t_{RESP})

The time interval between a) when the sensed input current reaches 90% of its full-scale value, and b) when the sensor output, V_{OUT}, reaches 90% of its full-scale output value.

Propagation Delay (t_{PD})

The time interval between a) when the sensed input current reaches 20% of its full-scale value, and b) when the sensor output, V_{OUT}, reaches 20% of its full-scale output value.

Rise Time (t_R)

The time interval between a) when the sensor output, V_{OUT}, reaches 10% of its full-scale value, and b) when the sensor output, V_{OUT}, reaches 90% of its full-scale value.

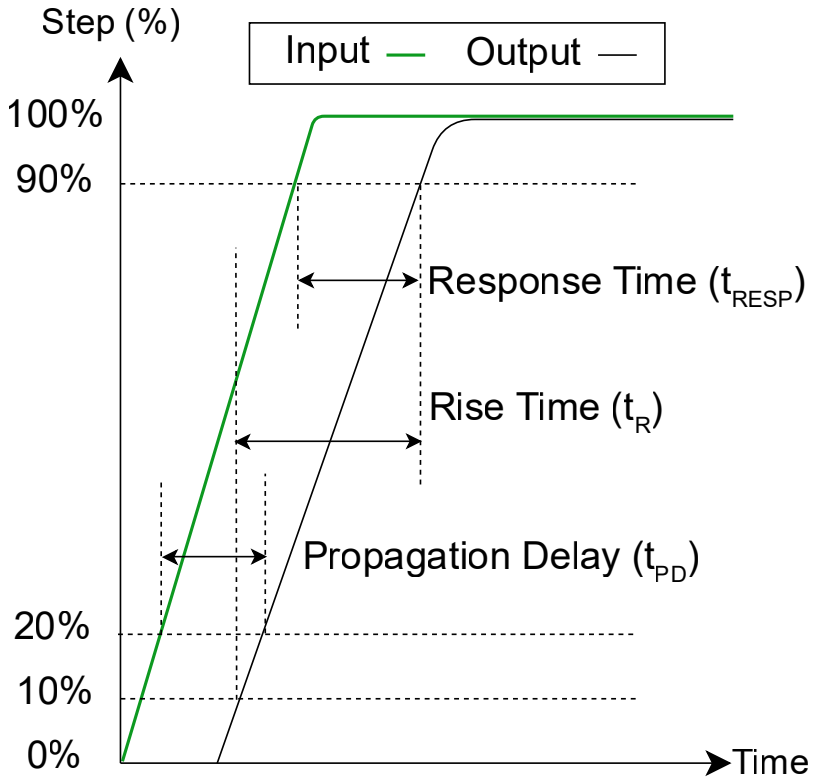

Figure 4: Step Response Characteristics

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FUNCTIONAL DESCRIPTION OF POWER ON/OFF OPERATION

Introduction

The behavior of V_{OUT} as V_{DD} reaches the required power-on voltage and as V_{DD} reduces to less than the required power-on voltage is shown in Figure 5 and Figure 6. These figures use the same labeling conventions for different voltage thresholds. References in brackets "[ ]" are valid for each of these graphs.

POWER-ON OPERATION

As V_{DD} ramps up, the VOUT pin is in a high-impedance (high-Z) state until V_{DD} reaches and exceeds V_{POR} [1]. Once V_{DD} exceeds V_{POR} [1], V_{OUT} enters typical operation and starts responding to applied current, I_P.

POWER-OFF OPERATION

As V_{DD} reduces to less than $V_{POR} - V_{POR_HYS}$, the outputs enter a high-Z state. The hysteresis on the power-on voltage prevents noise on the supply line from causing V_{OUT} to repeatedly enter and exit the high-Z state around the V_{POR} level.

NOTE: Because the device is entering a high-Z state and not driving the output, the time required for the output to reach a steady state depends on the external circuitry.

Voltage Thresholds

POWER-ON RESET RELEASE VOLTAGE (V_{POR})

If V_{DD} reduces to less than $V_{POR} - V_{POR_HYS}$ [2] while the sensor is in operation, the digital circuitry turns off and the output re-enters a high-Z state. After V_{DD} recovers and exceeds V_{POR} [1], the output enters typical operation after a delay of t_{PO}.

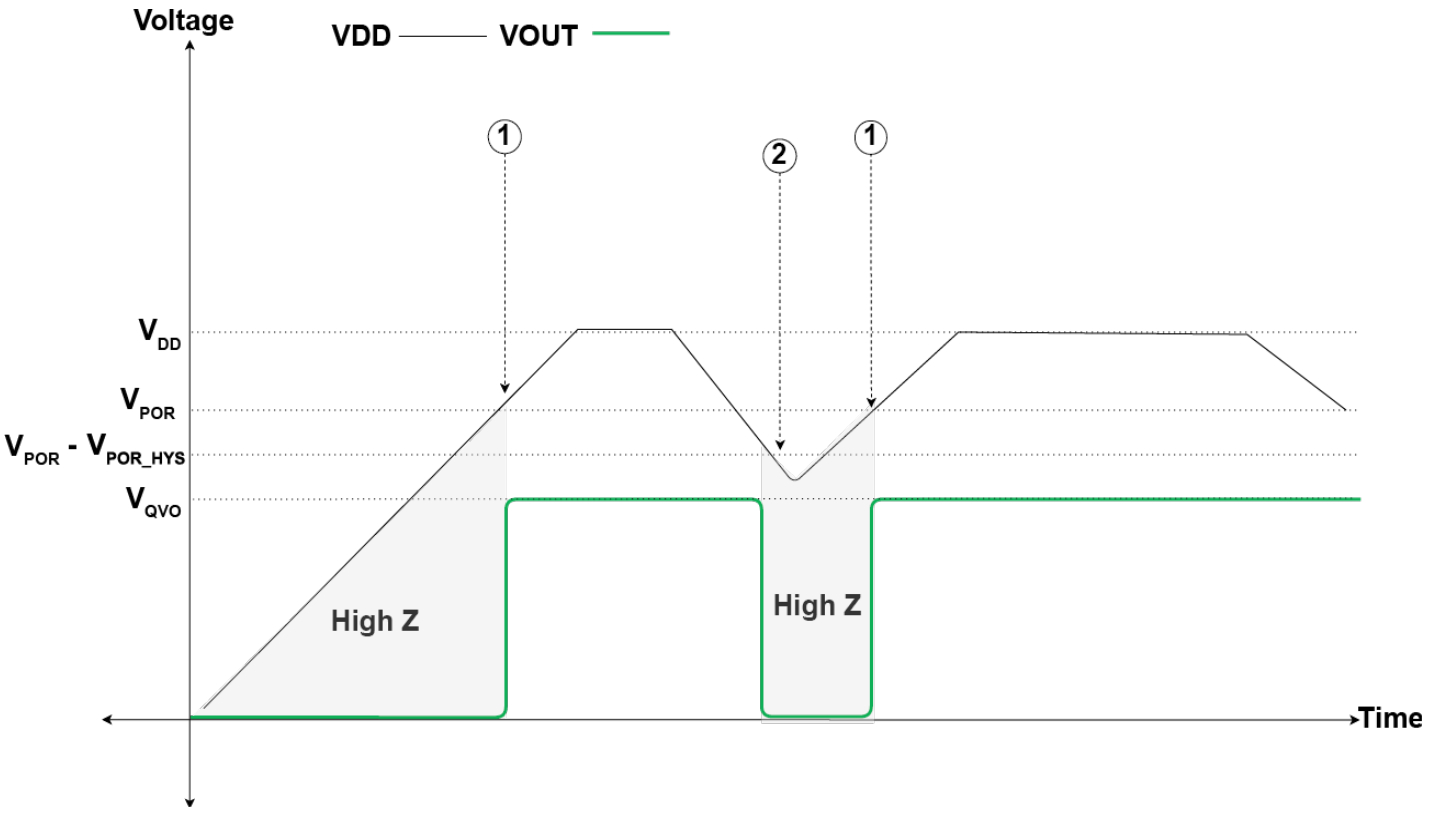

Figure 5: Power-On And Power-Off Operation

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Timing Thresholds

POWER-ON DELAY (t_{PO})

When the supply voltage reaches V_{POR} [1], the device requires a finite time to power its internal components before the outputs are released from the high-impedance state and start responding to the measured current, I_P. Power-on time, t_{PO}, is defined as the time required for the output voltage to settle within ±10% of its steady-state value under an applied current, I_P; this can be observed as the time from [1] to [A] in Figure 6.

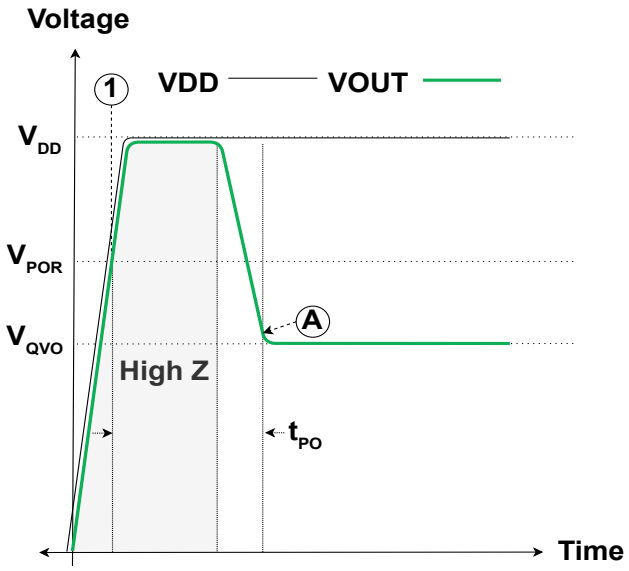

Figure 6: Power-On Delay, t_{PO}

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DEFINITIONS OF OPERATING AND PERFORMANCE CHARACTERISTICS

Quiescent Voltage Output (V_{QVO})

Quiescent voltage output, V_{QVO}, is defined as the voltage on the output, V_{OUT}, when current is not applied, $I_P = 0$.

$$V_{QVO} = V_{OUT_@0A}\ [mV]$$

Quiescent Voltage Output Error (V_{QVO_E})

Quiescent voltage output error, V_{QVO_E}, is defined as the deviation of V_{QVO} from the nominal target value in production testing.

$$V_{QVO_E} = V_{QVO_MEASURED} - V_{QVO_IDEAL}\ [mV]$$

Power Supply Offset Error (V_{OE_PS})

Power supply offset error, V_{OE_PS}, is defined as the change in V_{QVO} due to variations in the power supply voltage at a specific temperature. The power supply offset error is defined as the change in offset measured between the nominal supply voltage (V_{DD}) and V_{DD} ±E%, where E is the difference between V_{DD} and $V_{DD(MAX)}$ in percent. The error is expressed in mV to indicate how much the offset deviates from its ideal value due to changes in the supply voltage.

$$V_{OE_PS} = V_{QVO_{@VDD\pm E\%,T_A}} - V_{QVO_{@VDD,T_A}}\ [mV]$$

Sensitivity (Sens)

Sensitivity, or Sens, is defined as the ratio of the V_{OUT} swing and the current through the primary conductor, I_P. The current causes a voltage change on V_{OUT} away from V_{QVO} until V_{SAT}. The magnitude and direction of the output voltage is proportional to the magnitude and direction of the current, I_P. The proportional relationship between output voltage and current is sensitivity, defined as:

$$Sens = \frac{V_{OUT_IP1} - V_{OUT_IP2}}{I_{P1} - I_{P2}}\ [mV/A]$$

where I_{P1} and I_{P2} are two different currents, and $V_{OUT}(I_{P1})$ and $V_{OUT}(I_{P2})$ are the respective output voltages, at VOUT, at those currents.

Sensitivity Error (E_{SENS})

Sensitivity error, E_{SENS}, is the deviation of sensitivity from the nominal sensitivity target value in production testing.

$$E_{SENS} = \frac{SENS_{MEASURED} - SENS_{IDEAL}}{SENS_{IDEAL}}\ x\ 100\ [\%]$$

Power Supply Sensitivity Error (E_{SENS_PS})

Power supply sensitivity error, E_{SENS_PS}, is a measure of the change in sensitivity due to variations in the power supply voltage at a specific temperature. The power supply sensitivity error is defined as the percentage change in sensitivity measured between the nominal supply voltage (V_{DD}) and V_{DD} ±E%, where E is the difference between V_{DD} and $V_{DD(MAX)}$ in percent. The error is expressed as a percentage to indicate how much the sensitivity deviates from its ideal value due to changes in the supply voltage.

$$E_{SENS_PS} = \frac{SEN_{@VDD\pm E\%,T_A} - SENS_{@VDD,T_A}}{SENS_{@VDD,T_A}}\ x\ 100\ [\%]$$

Output Saturation Voltage (V_{SAT_H} and V_{SAT_L})

Output saturation voltage, V_{SAT}, is defined as the minimum and maximum voltages the VOUT output budder can drive. V_{SAT_H} is the highest voltage the output can reach, while V_{SAT_L} is the lowest. In other states, the VOUT pin may be pulled outside of V_{SAT_L} and V_{SAT_H}. Note that changing the sensitivity does not change the V_{SAT} points.

Error Including Lifetime Drift (E_{SENS_LT} and V_{QVO_LT})

Lifetime drift characteristics are based on the mean drift of the worst-case distribution observed during AEC-Q100 qualification stresses.

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OVERCURRENT FAULT (OCF) BEHAVIOR

The overcurrent fault (OCF) function (ACS37029 only) pulls the open-drain FAULT pin low when the applied current exceeds a preset threshold (I_{OCR}). On the ACS37029, this threshold is internally set to 100% of the full-scale (FS) rated current. This flag trips symmetrically for positive and negative applied currents.

The implementation for the OCF circuitry is accurate over temperature and does not require further temperature compensation.

OVERCURRENT ERROR (I_{OC_E})

Overcurrent error (I_{OC_E}) is the error between the ideal I_{OC} and the measured I_{OC}.

OVERCURRENT HYSTERESIS (I_{OC_HYS})

Overcurrent hysteresis (I_{OC_HYST}) is defined as the magnitude of current in percentage of the FS that must reduce before a fault assertion clears. This can be observed as the separation between voltages [9] and [10] in Figure 7.

OVERCURRENT FAULT RESPONSE TIME (t_{OC_RESP})

Overcurrent response time (t_{OC_RESP}) is defined as the time from when the input reaches the operating point [9] until the OCF pin reduces to less than V_{FAULT_L} [G].

OVERCURRENT FAULT HOLD TIME (t_{OC_HLD})

Overcurrent hold time (t_{OC_HLD}) is defined as the minimum time for which the OCF flag asserts after an OCF event. After the hold time is reached, OCF releases if the OCF condition has ended ([G] until [J] in Figure 8) or persists if the OCF condition remains present.

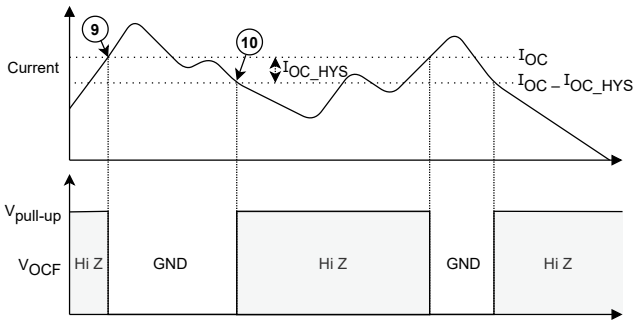

Figure 7: Fault Thresholds and OCF Pin Functionality

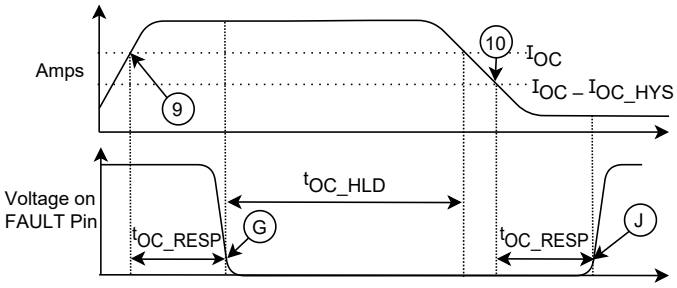

Figure 8: Fault Hold with Clear Fault After Hold Time

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THERMAL PERFORMANCE

Thermal Rise vs. Primary Current

Resistive heating due to the flow of electrical current in the package should be considered during the thermal design of the application. The sensor, PCB, and PCB terminals generate heat and act as a heat sink.

The thermal response is highly dependent on the PCB layout, copper thickness, cooling method, and the profile of the injected current (including peak current, current on-time, and duty cycle).

In-pad vias help improve thermal performance. Placing vias under the copper pads of the board reduces electrical resistance and improves heat conduction to the PCB (Figure 9 and Figure 10). The ACSEVB-LZ8-LZ6 and ACSEVB-MZ8-MY6 evaluation boards include in-pad vias and are recommended to improve thermal performance.

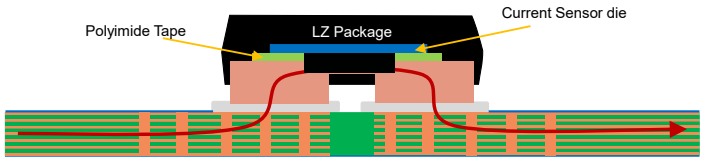

Figure 9: Vias Under Copper Pads (LZ Package)

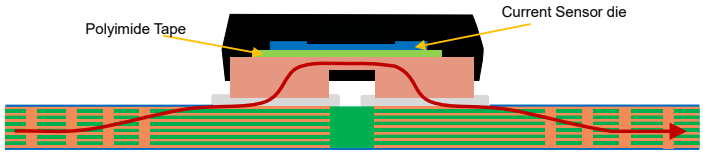

Figure 10: Vias Not Present Under Copper Pads (LZ Package)

The measured rise in steady-state die temperature of the LZ package versus DC continuous current at an ambient temperature, T_A, of 25°C is shown in Figure 11 for two board designs: filled vias under copper pads and vias not present under copper pads (vias outside pad).

NOTE: The thermal offset curves may be directly applied to other values of T_A. Using in-pad vias has better thermal performance than not using in-pad vias.

The measured rise in steady-state die temperature of the LZ package versus DC continuous current at an ambient temperature of 25°C and an ambient temperature of 125°C is shown in Figure 12. The measured rise in steady-state die temperature of the MY package versus DC continuous current at an ambient temperature of 25°C and an ambient temperature of 125°C is shown in Figure 13. These evaluation boards use filled vias under the copper pads.

The thermal capacity of the ACS37030-32 in the LZ and MY packages should be verified by the end user in the application-specific conditions. The maximum junction temperature, T_{JMAX} (165°C), should not be exceeded.

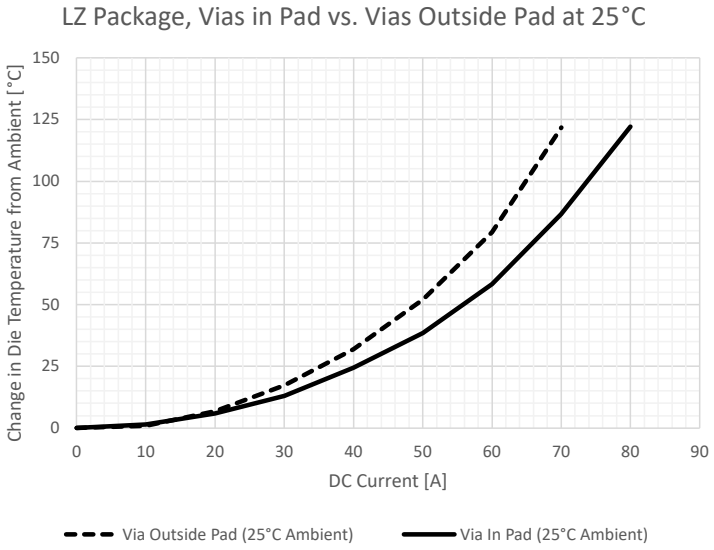

Figure 11: LZ Package Comparison with and without In-Pad Vias at Ambient Temperature

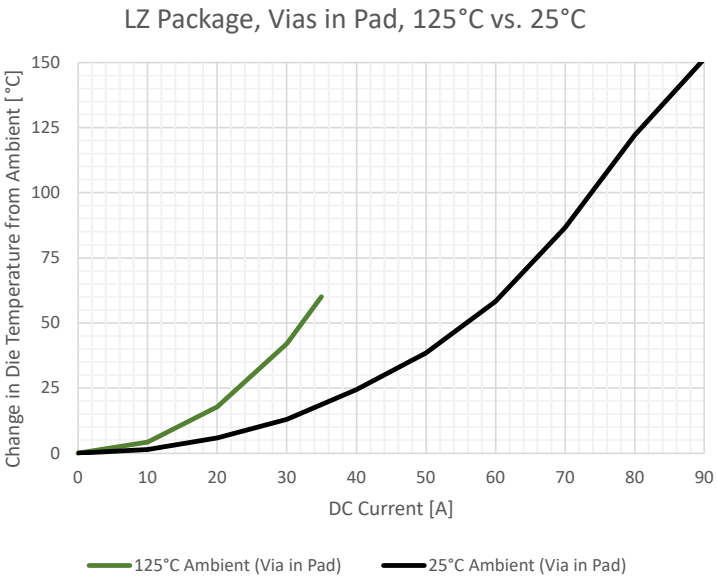

Figure 12: LZ Package Comparison at 125°C and 25°C, In-Pad Vias

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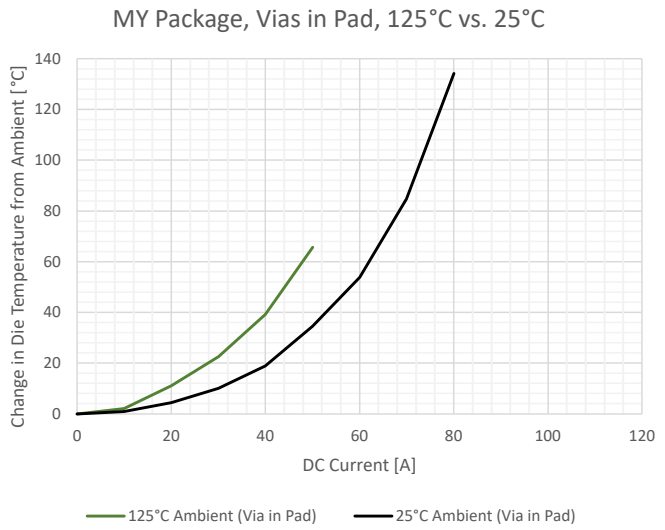

Figure 13: MY Package Comparison at 125°C and 25°C, In-Pad Vias

Evaluation Board Layout

The LC/LZ current sensor evaluation board (ACSEVB-LC8-LZ6, TED-0004110) was used to collect the thermal data shown in Figure 11 and Figure 12. This board includes six layers. The evaluation board is shown in Figure 14.

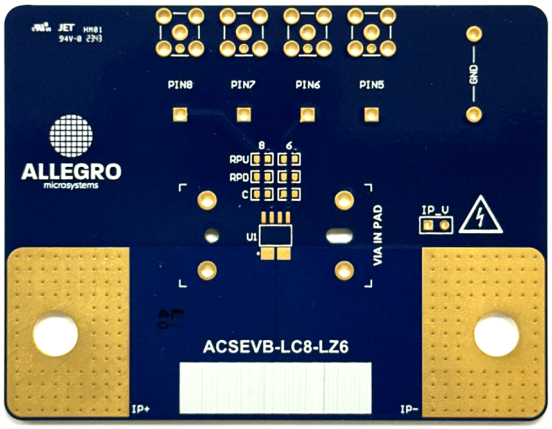

Figure 14: LZ Package Allegro Evaluation Board

The MZ/MY current sensor evaluation board (ACSEVB-MZ6-MY6, TED-0004281) was used to collect the thermal data shown in Figure 15. This board includes six layers. The evaluation board is shown in Figure 15.

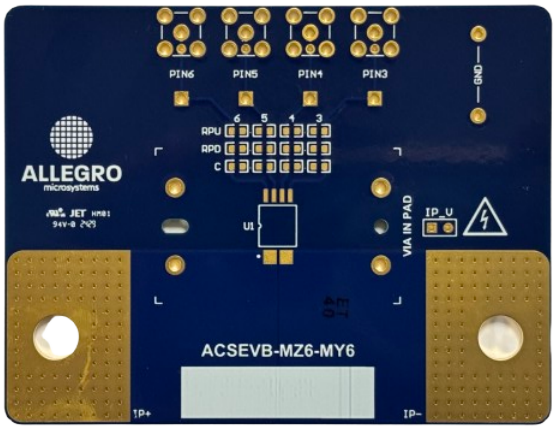

Figure 15: MY Package Allegro Evaluation Board

Design support files for the ACSEVB-LC8-LZ6 and ACSEVB-MZ6-MY6 evaluation boards are available for download from the Allegro website. See the technical documents section of the ACS37030-32 webpage for more information.

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PACKAGE OUTLINE DRAWING

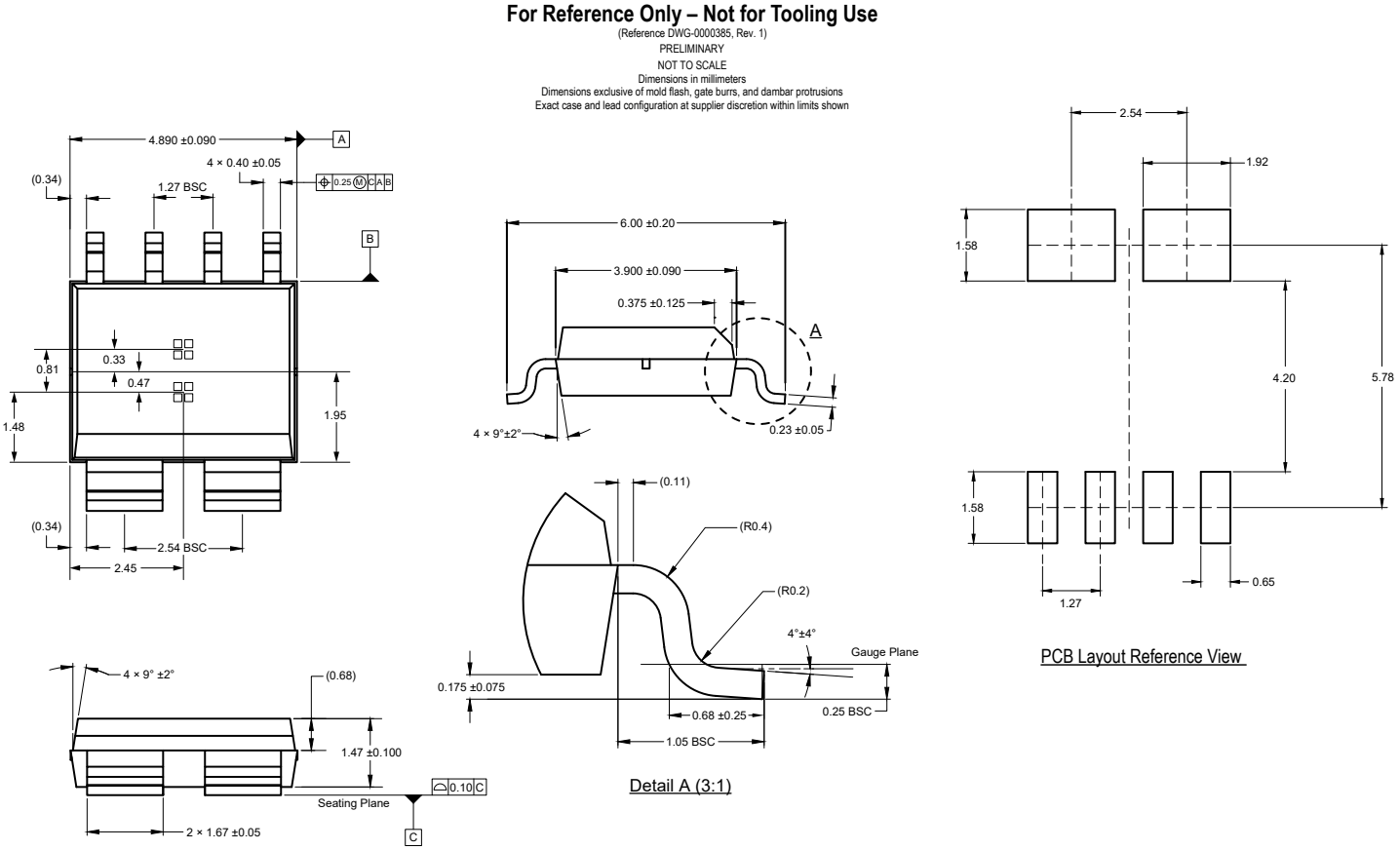
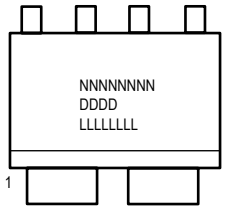


Figure 16: Custom 6-Pin SOIC (Suffix LZ)



Standard Branding Reference View

N = Device Part Number
D = Date Code
L = Assembly Lot Number

Figure 17: LZ Package Branding

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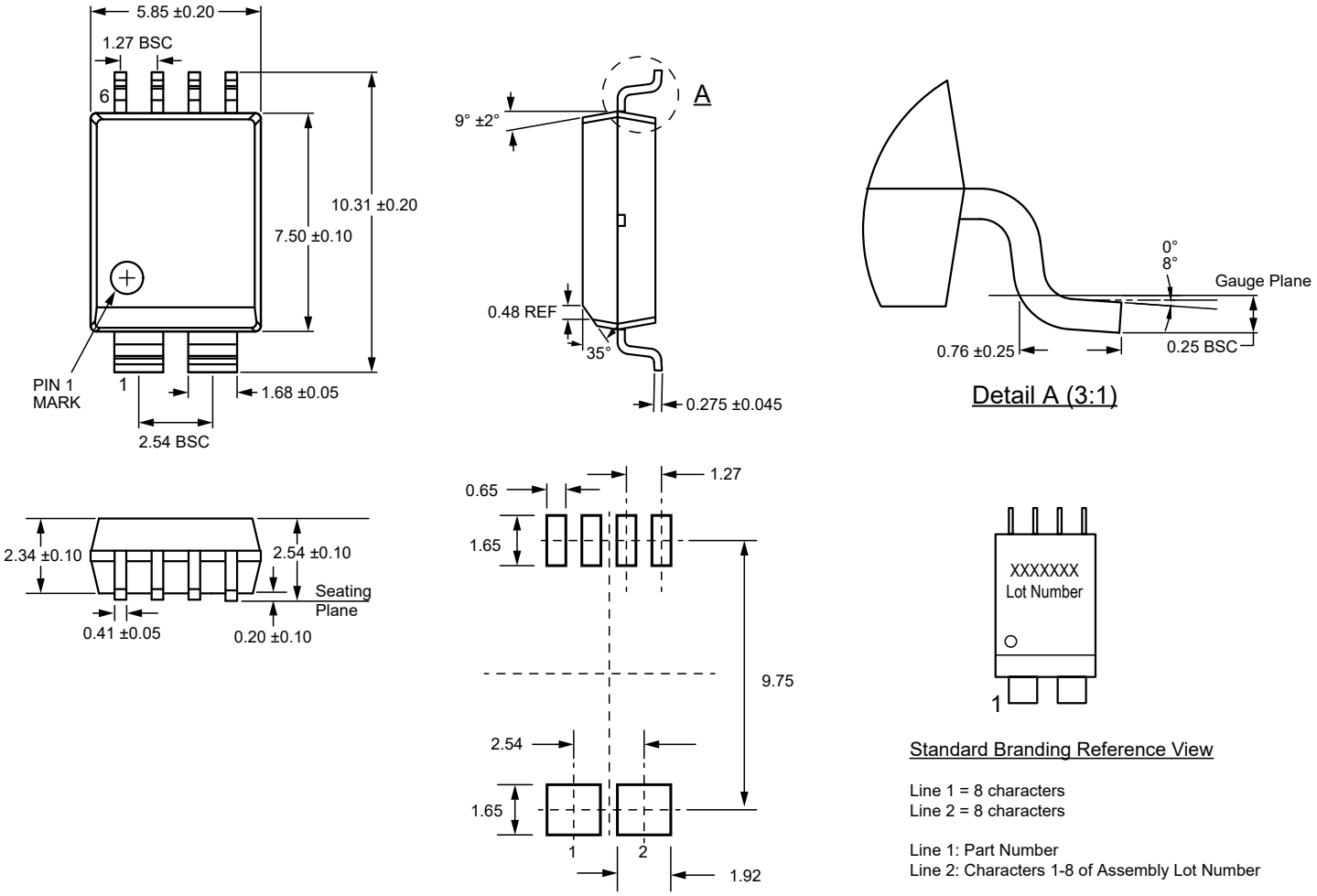
PACKAGE OUTLINE DRAWING

For Reference Only – Not for Tooling Use

(Reference Allegro DWG-0000388, Rev. 4)

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



PCB Layout Reference View

All pads a minimum of 0.20 mm from all adjacent pads; adjust as necessary to meet application process requirements and PCB layout tolerances

Standard Branding Reference View

Line 1 = 8 characters
Line 2 = 8 characters

Line 1: Part Number
Line 2: Characters 1-8 of Assembly Lot Number

Branding scale and appearance at supplier discretion

Figure 18: Custom 6-Pin SOIC (Suffix MY)

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Revision History

Number	Date	Description
–	November 29, 2023	Initial release
1	January 18, 2024	Added UL Number (page 1); removed "certification pending" footnote from Isolation Characteristics table (page 3); updated Sensitivity Error and Coil Path Sensitivity Error test conditions (pages 6-11); updated Thermal Performance section (pages 18-19)
2	June 12, 2024	Added output resistive load characteristic (page 5)
3	March 14, 2025	Added MY package variants and overhauled datasheet for MY package variants (all pages)
4	May 21, 2025	Corrected Figure 1 pinout numbering (page 1); updated LZ PACKAGE Isolation Characteristics (page 3); updated typical value for Common-Mode Field Rejection and Overcurrent Response Time (page 6)
5	July 29, 2025	Updated Features and Benefits (page 1), updated MY Package Drawing (page 28)
6	February 3, 2026	Removed overcurrent hold time characteristic (page 6), modified Overcurrent Fault (OCF) Behavior section (page 24), and made minor formatting changes throughout
7	May 20, 2026	Corrected reel quantity for wide-body package in selection guide (page 2)

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