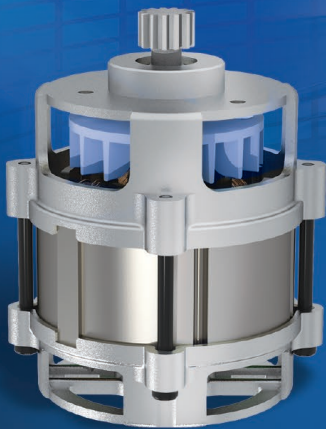


STANDARD LINEAR
PRODUCTS



STANDARD LINEAR PRODUCTS

Diodes Incorporated offers a portfolio of devices that meets the requirements of a wide range of electronic applications. By addressing these competing design criteria, Diodes is able to produce elegant and practical solutions.

The breadth of Diodes' standard Linear portfolio provides designers with cost-effective, industry-standard replacements to high-performance devices for the most demanding industrial and automotive applications.

The Diodes portfolio is well suited to meeting the circuit requirements of:

- High-end consumer electronics
- Portable consumer electronics
- Communications
- Computers
- Industrial
- Automotive

Diodes' standard Linear range extends the performance of many industry-standard parts.

Offered in a choice of space-saving packages, they provide the opportunity to reduce power consumption and increase operating temperature.

With its knowledge, packaging, and technology leadership, Diodes has created a wide range of competitive, standard Linear ICs.

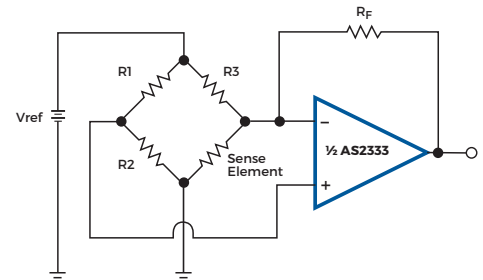
OPERATIONAL AMPLIFIERS

Part Number	Automotive Compliant Qualified to AEC-Q100 and Supports PPAPs	No. of Channels	V _{CC}	I _{CC}	V _{OS}	I _B	V _{ICM} Range	I _{OUT} (Source)	I _{OUT} (Sink)	Rail-rail (input/Output)	Packages
			V	mA	mV	nA	V	mA	μA		
AS321	N	1	3-36	0.35	2	20	V- to V+ -1.5	40	15	No	SOT25
AS358/A	N	2	3-36	0.5	2	20	V- to V+ -1.5	40	15	No	MSOP-8; TSSOP-8; SO-8
LM2904/A	LM2904Q/AQ	2	3-36	0.5	2/1	25	V- to V+ -1.5	16	16	No	MSOP-8; TSSOP-8; SO-8
AS324/A	N	4	3-36	0.7	2	20	V- to V+ -1.5	40	15	No	TSSOP-14; SO-14
LM2902/A	LM2902Q/AQ	4	3-36	0.7	2/1	25	V- to V+ -1.5	16	16	No	TSSOP-14; SO-14
TLV271	N	1	2.7-16	0.55	0.5	0.001	V- -0.2 to V+ -1.35	13	12	Output	SOT25; SO-8
TLV272	N	2	2.7-16	1.1	0.5	0.001	V- -0.2	13	12	Output	MSOP-8; SO-8
TLC27L1/A/B	N	1	3-16	0.01	1.1/0.9/0.24	0.0006	V- -0.2 to V+ -1.0	15	15	No	SO-8
TLC271/A/B	N	1	3-16	0.01	1.1/0.9/0.24	0.0006	V- -0.2 to V+ -1.0	15	15	No	SO-8
AS2333	N	2	1.8-5.5	0.012	0.008	0.007	V- -0.1 to V+ +0.1	5	14	Input & Output	MSOP-8; SO-8; U-DFN3030-8
AZV831	N	1	1.6-5.5	0.07	0.5	0.001	V- -0.2 to V+ +0.2	8.5	10	Input & Output	SOT25
AZV832	N	2	1.6-5.5	0.14	0.5	0.001	V- -0.2 to V+ +0.2	8.5	10	Input & Output	MSOP-8; SO-8
LMV321	N	1	2.5-5.5	0.11	1.7	15	V- to V+ -1	60	90	Output	SOT25; SOT353
LMV358	N	2	2.5-5.5	0.19	1.7	15	V- to V+ -1	60	90	Output	MSOP-8; SO-8
LMV324	N	4	2.5-5.5	0.34	1.7	15	V- to V+ -1	60	90	Output	TSSOP-14; SO-14
AZV321	N	1	2.7-5.5	0.13	1.7	11	V- -0.1 to V+ -0.8	60	160	Output	SOT25; SOT353
AZV358	N	2	2.7-5.5	0.21	1.7	15	V- -0.1 to V+ -0.8	60	160	Output	MSOP-8; TSSOP-8; SO-8

THE DIODES ADVANTAGE

Industry-standard operational amplifiers for multi-operating voltages from 1.8V to 5.5V

- **AS2333**
High-precision RIRO op-amps for medical and industrial instrumentation.
- **AS321/358/324 series industry-standard general-purpose op-amps**
-40°C to 85°C ambient temperature range
- **LMV321/358/324, AZV831/2, and AZV321/358 series**
Industry-standard, low-voltage, general-purpose op-amps
- **Automotive-compliant LM2902Q/04Q family**



CURRENT MONITORS

Part Number	Automotive Compliant Qualified to AEC-Q100 and Supports PPAPs	Output Type	High/Low Side	V _{CC} /V _B Range	V _{SENSE} Common-Mode Range	Max V _{SENSE}	V _{OUT}	Accuracy @V _{SENSE} =100mV	I _Q	Output/V _{SENSE} Gain	Package
				V	V	V	V	%	μA		
ZXCT1008	ZXCT1008Q	Current	H	None	2.5-20	0.5	V _{s+} -2.5	2.5	4	10mA/V	SOT23
ZXCT1009	ZXCT1009Q	Current	H	None	2.5-20	2.5	V _{s+} -2.5	2.5	4	10mA/V	SM-8
ZXCT1010	N	Current	H	None	2.5-20	2.5	V _{s-} -1	2.5	3.5	10mA/V	SOT25
ZXCT1020	N	Current	H	2.7-20	2.5-V _b	0.5	V _{s-} -1	2	25	Ext resistor	SOT25
ZXCT1021	N	Voltage	H	None	2.5-20	1.5	V _{s-} -1	2	25	25	SOT25
ZXCT1022	N	Voltage	H	None	2.5-20	0.18	V _{s-} -1	-	25	100	SOT25
ZXCT1023	N	Voltage	H	None	2.5-20	0.38	V _{s-} -1	-	3.5	50	TDFN1812-4
ZXCT1041	N	Voltage	H	None	2.7-20	0.8	V _{s-} -1	2	35	10	SOT25
ZXCT1050	N	Current	H/L	2.7-20	0-V _{CC} -2	0.5	V _{CC} -2	3	50	Ext resistor	SOT25
ZXCT1051	N	Voltage	H/L	2.5-20	0-V _{CC} -2	0.3	V _{CC} -2	3	50	10	SOT25
ZXCT1080	ZXCT1080Q	Voltage	H	4.5-12	3-60	0.15	V _{s-} -1.5	3	30	10	SOT25
ZXCT1081	ZXCT1081Q	Voltage	H	4.5-12	3-40	0.15	V _{s-} -1.5	3	30	10	SOT25
ZXCT1082	ZXCT1082Q	Current	H	2.7-60	2.7-60	0.5	V _{s-} -1	2	2	Ext resistor	SOT25
ZXCT1083	ZXCT1083Q	Current	H	2.7-40	2.7-40	0.5	V _{s-} -1	2	2	Ext resistor	SOT25
ZXCT1084	ZXCT1084Q	Voltage	H	2.7-60	2.7-60	0.5	V _{s-} -1	2	2	25	SOT25
ZXCT1085	ZXCT1085Q	Voltage	H	2.7-40	2.7-40	0.5	V _{s-} -1	2	2	25	SOT25
ZXCT1086	ZXCT1086Q	Voltage	H	2.7-60	2.7-60	0.5	V _{s-} -1	2	2	50	SOT25
ZXCT1087	ZXCT1087Q	Voltage	H	2.7-40	2.7-40	0.5	V _{s-} -1	2	2	50	SOT25
ZXCT1107	ZXCT1107Q	Current	H	None	2.5-36	0.8	V _{s+} -2.5	3.4	3	4mA/V	SOT23
ZXCT1109	ZXCT1109Q	Current	H	None	2.5-36	0.8	V _{s+} -2.5	3.4	3	4mA/V	SOT23
ZXCT1110	ZXCT1110Q	Current	H	None	2.5-36	0.8	V _{s-} -1	1.8	3	4mA/V	SOT23-5



THE DIODES ADVANTAGE

ZXCT current monitors convert a high-side current measurement to a ground referred current/voltage output; greatly simplifying high-sided current measurement.

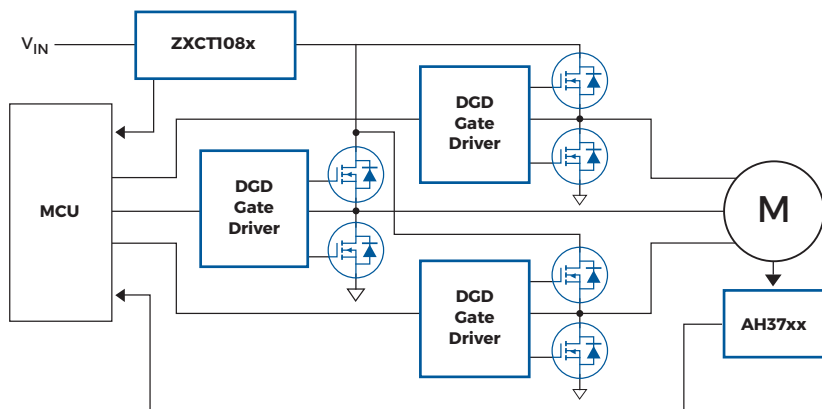
- Measures current without disrupting the ground reference point
- Current-output versions provide simple programmability of gain

- Voltage-output versions reduces component count
- ZXCT1008/1009/1107/1109 in SOT23 package
- ZXCT108x common-mode sensing up to 60V lines
- ZXCTxxxQ automotive-compliant versions AEC-Q100 qualified, manufactured in IATF 16949 certified sites supporting PPAP documents

In many motor drive applications, be it BLDC or brushed motor, simple current sensing is used to detect overcurrent conditions. These could be due to motor stalling or heavy loads.

The ZXCT108x are line powered, and with their 60V maximum common-mode voltage, they support 12V, 24V, and some 48V motor-drive overcurrent-sensing without affecting the system's ground reference point.

The fixed gain ZXCT1084/86 require a minimal number of external components, whereas the ZXCT1082 allows the gain to be adjusted to the applications needs via three external resistors.



COMPARATORS

Part Number	Automotive Compliant	No. of Channels	V _{CC}	I _{CC}	V _{OS}	I _B	V _{ICM} Range	I _{OUT}	Packages
			V	mA	mV	nA	V	mA	
AS331	N	1	2-36	0.4	1	25	V- to V-1.5	16	SOT25
AS393/A	N	2	2-36	0.6	1	25	V- to V-1.5	16	MSOP-8; TSSOP-8; SO-8
AS339/A	N	4	2-36	0.9	2	25	V- to V-1.5	16	TSSOP-14; SO-14
LM2903/A	LM2903Q/AQ	2	2-36	0.6	2/1	25	V- to V-1.5	16	MSOP-8; TSSOP-8; SO-8
LM2901/A	LM2901Q/AQ	4	2-36	0.9	2/1	25	V- to V-1.5	16	TSSOP-14; SO-14
AZV3001/A	N	1	1.3-5.5	0.006	3	0.001	V- to V+	68	X2-DFN1410-6
AZV3002	N	2	1.3-5.5	0.006	3	0.001	V- to V+	68	U-FLGA1616-8
AZV50001	N	1	1.6-5.5	0.0075	-	-	-0.1 to V+ +0.1	0.1	X2-DFN1210-6
AZV50002	N	2	1.6-5.5	0.0075	-	-	-0.1 to V+ +0.1	0.1	U-QFN1418-10
AZV331	N	1	2.5-5.5	0.06	1.7	10	V- to V+ -0.8	23	SOT25; SOT353
LMV331	N	1	2.7-5.5	0.04	1.7	10	V- to V+ -0.8	23	SOT25; SOT353
AZV3002	N	2	1.3-5.5	0.006	3	0.001	V- to V+	68	U-FLGA1616-8
AZV393	N	2	2.5-5.5	0.07	1.7	10	V- to V+ -0.8	23	MSOP-8; TSSOP-8; SO-8
LMV393	N	2	2.7-5.5	0.07	1.7	10	V- to V+ -0.8	23	MSOP-8; SO-8
APX339	N	4	2.5-5.5	0.24	1.7	25	V- +0.2 to V+ -0.2	60	TSSOP-14



THE DIODES ADVANTAGE

Industry-standard comparators for multi-market applications:

- AS331/393/339 series industry-standard, general-purpose comparators
- LM2901/3 series extended industrial temperature comparators
- LMV331/393/339 and AZV331/393 series industry-standard, low-voltage, general-purpose comparators
- AZV5001/2 headphone detection comparators
- Automotive-compliant LM2901Q/03Q family

PERIPHERAL DRIVERS

Part Number	Drivers per Package	Input Compatibility			V _{IN} Max	V _{CE} /V _{DS} Max Rating	V _{OUT} Max	I _{OUT} Max	T _{PHL} /T _{PLH}	Packages
		TTL	CMOS	PMOS	V	V	V	mA	NS	
ULN2002A	7	Yes	Yes	No	30	50	50	500	250	SO-16, PDIP-16
ULN2003A	7	Yes	Yes	No	30	50	50	500	250	SO-16, PDIP-16
ULN2003F12	4	Yes	Yes	No	5.5	16	16	1000	50	U-DFN3030-10
ULN2003V12	7	Yes	Yes	No	5.5	16	16	1000	50	SO-16; TSSOP-16
ULN2004A	7	No	Yes 6-15V	Yes	30	50	50	500	250	SO-16; PDIP-16

555 TIMER ICs

Part Number	Automotive Compliant	V _{CC} Range	F _{MAX}	T _{RISE} Max	I _{CC} @ V _{CC} = 5V		Package
		V	MHz	ns	Output Low	Output High	
					mA	mA	
NA555	No	4.5-16	0.5	300	3	2	SO-8
NE555	No	4.5-16	0.5	300	3	2	SO-8
SA555	No	4.5-16	0.5	300	3	2	SO-8
SE555Q	Yes	4.5-16	0.5	300	3	2	SO-8

SHUNT REGULATORS

Part Number	Compliance (Only Automotive supports PPAPs)	V _{REF}	Accuracy	V _{IN} Max	I _{OUT} Max	Min I _{KA} (Typical)	Packages (SOT23 footprint)
		V	%	V	mA	μA	
AZ431	Standard	2.5	0.4; 0.8	36	100	400	SOT23 (TL432); TO92; SOT89
AN431	Standard	2.5	0.5; 1	36	100	400	SOT23 (TL431)
AS431	Standard	2.5	0.5; 1	36	100	400	SOT23 (TL432); SOT25; SOT89; TO92
AS431H	Standard	2.495	0.5; 1	36	100	400	SOT23; TO92
ZR431	Standard	2.5	0.5; 1; 2	20	100	50	SOT23 (TL432)
ZTL431Q	Automotive	2.5	0.5; 1	20	100	400	SOT23 (TL431); SOT25
ZTL432Q	Automotive	2.5	0.5; 1	20	100	400	SOT23 (TL432)
AP431S	Standard	2.5	0.5; 1	40	100	50	SOT23; SOT89; TO92
AP431SH	Standard	2.495	0.5; 1	40	100	50	SOT23; SOT89; TO92
AZ431L	Standard	1.24	0.5; 1	18	100	55	SOT23; SOT25; SOT89; TO92
TLV431Q	Automotive	1.24	0.2; 0.5; 1	18	15	55	SOT23; SOT25
AZ9431BQ	Automotive	1.24	1	18	100	55	SOT23
ZXRE160	Standard	0.6	0.5; 1	18	15	45	SOT353; TSOT25; X2-DFN1520-6



THE DIODES ADVANTAGE

Diodes' shunt regulators and references provide cost-effective solutions to a variety of consumer, power supply, industrial, and automotive applications.

- LM4040/1 equivalents with automotive-compliant versions
- Extra low-knee current 1.2V, 2.5, 3.3, and 5V shunt references
- 2.5V, 2.495V TL431-equivalent shunt regulators
- Extra low-knee current shunt regulator variants AP431S/SH and ZR/ZHT431
- 1.24V TLV431-equivalent shunt regulators
- 0.6V single- and dual-shunt regulators

VOLTAGE REFERENCES

Part Number	Automotive Compliant	V _{REF}	Accuracy	I _{OUT} Max	I _{KA} (Min)	Typical Temperature Coefficient	Noise Voltage	Packages
		V	%	mA	μA	ppm/°C	μV/√Hz	
ZXRE125	N	1.22	0.5; 1; 2	20	8	20	60	SOT23
LM4041	LM4041Q	1.225	0.5; 1	12	30	15	20	SOT353; SOT23
ZXRE4041	N	1.225	0.5; 1; 2	12	30	20	60	SOT23
LM4041_ADJ	LM4041_ADJQ	1.233	1	12	30	15	20	SOT23
ZRC250	N	2.5	1; 2	5	20	30	60	SOT23
LM4040-2.5	LM4040Q-2.5	2.5	0.2; 0.5; 1	15	60	15	35	SOT23
LM4040-3.0	LM4040Q-3.0	3	0.2; 0.5; 1	15	62	15	35	SOT23
LM4040-3.3	LM4040Q-3.3	3	0.2; 0.5; 1	15	62	15	35	SOT23
ZXRE330	N	3.3	0.5; 2	5	1	20	55	SOT23; TO92
ZRC330	ZRC330Q	3.3	1; 2	5	20	15	75	SOT23
LM4040-4.1	LM4040Q-4.1	4.096	0.2; 0.5; 1	15	83	15	80	SOT23
ZRC400	N	4.096	1	5	23	30	64	SOT23
ZR4040-4.1	N	4.096	1	20	50	20	90	SOT23
ZRC500	N	5	1	5	25	30	105	SOT23
ZRB500	N	5	1; 2	15	50	15	105	SOT23
LM4040-5.0	LM4040Q-5.0	5	0.2; 0.5; 1	15	60	15	80	SOT23



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