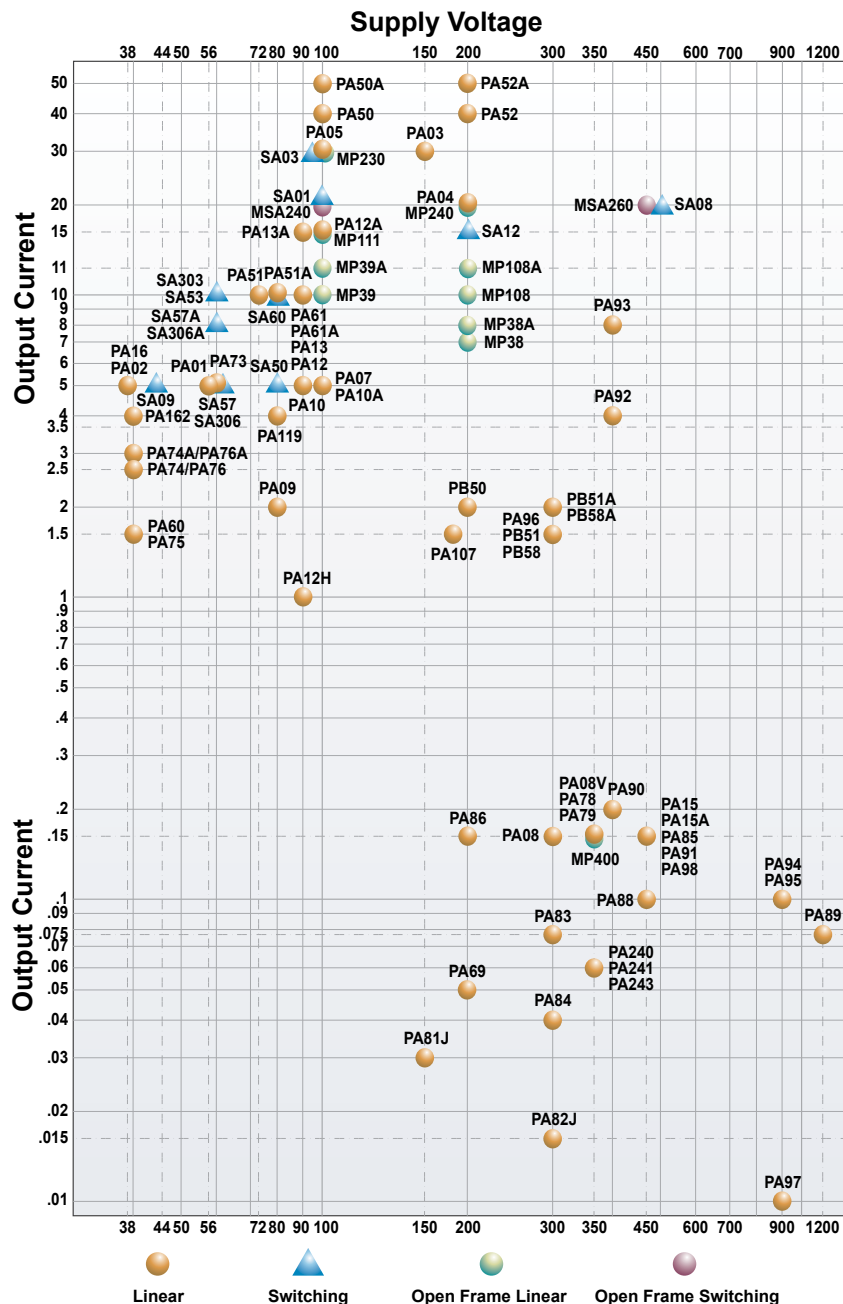


Apex Precision Power™ Products

POWER ANALOG ICs, MODULES AND HYBRIDS

Apex Precision Power™ is the brand name for Cirrus Logic's high performance precision power analog family. Apex Precision Power™ products drive innovation in the design and manufacturing of power operational amplifiers (linear) and pulse width modulation amplifiers (PWM/switching). A mix of IC, board-level module and hybrid product designs are used to deliver up to 50 A of output current while operating on voltage supplies ranging from 8.5 V up to 1200 V. Target applications focus on the high power precision control of current, voltage and speed in the industrial, test and measurement, aerospace and medical markets.

APEX PRECISION POWER™ PRODUCT MATRIX – LINEAR, PWM AMPLIFIERS



LEARN MORE AT
www.cirrus.com

Apex Precision Power™ High-Current Linear Amplifiers

SPECIFICATIONS

Model	Output Current MAX (A)	Supply Voltage MAX (V)	Slew Rate TYP (V/us)	Standby Current MAX (mA)	Power Dissipation MAX (W)
PA50A	50	100	50	36	400
PA52A	50	200	50	36	400
PA50	40	100	50	36	400
PA52	40	200	50	36	400
MP230FC	30	100	15	35	210
PA03	30	150	8	300	500
PA05	30	100	100	120	250
MP240FC	20	200	14	25	170
PA04	20	200	50	90	200
MP111FD	15	100	130	157	170
PA12A	15	100	4	50	125
PA13A	15	90	4	50	135
MP108FDA	11	200	170	65	100
MP39CLA	11	100	10	24	125
MP108FD	10	200	170	65	100
MP39CL	10	100	10	24	125
PA12	10	90	4	50	125
PA13	10	90	4	50	135
PA51	10	72	2.6	10	97
PA61	10	90	2.8	10	97
MP38CLA	8	200	63	24	125
PA93	8	400	50	14	125
MP38CL	7	200	63	24	125
PA01	5	56	2.6	50	67
PA02	5	38	20	40	48
PA07	5	100	4	30	67
PA10	5	90	3	30	67
PA16	5	38	20	40	62.5
PA73	5	60	2.6	5	67
PA162	4 x 1	40	1.4	20	45
PA119	4	80	900	120	78
PA92	4	400	50	14	80
PA09M	3	80	200	85	78
PA74A	2 x 3	40	1.4	40	36/60
PA76A	2 x 3	40	1.4	40	36/60
PA74	2 x 2.5	40	1.4	40	36/60
PA76	2 x 2.5	40	1.4	40	36/60
PA09	2	80	200	85	78
PB50	2	200	100	25	35
PA60EU	2 x 1.5	40	1.4	10	16/31
PA75CC	2 x 1.5	40	1.4	10	19/28
PA96	1.5	300	250	18	83
PB51	1.5	300	100	18	83
PB58	1.5	300	250	35	70
NEW PA107	1.5	180	3000	21	60
PA12H	1	90	4	100	6

NEW

Apex Precision Power™ High-Current PWM Amplifiers

SPECIFICATIONS

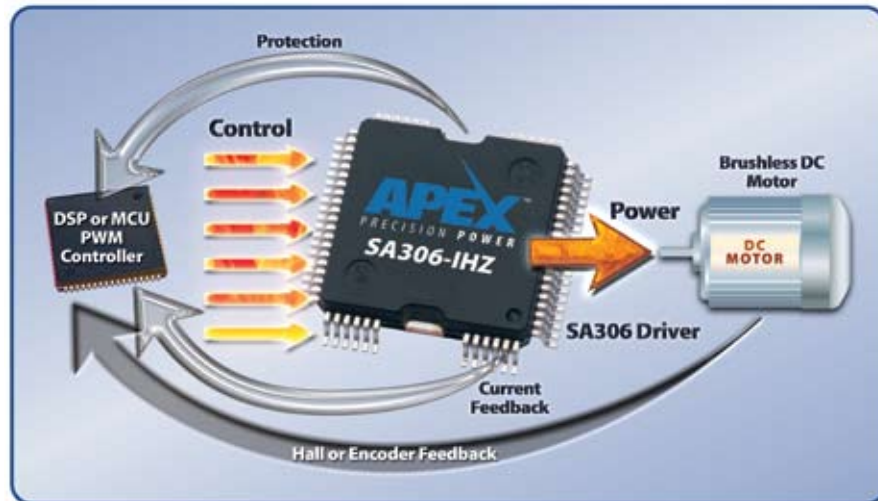
Mode	Output Current MAX (A)	Supply Voltage MAX (V)	Switching Frequency MAX (kHz)	Power Delivery MAX (kW)	Power Dissipation MAX (W)
SA03	40	100	22.5	3.6	300
SA08	28	450	22.5	12.4	250
SA01	30	100	42	2.7	185
MSA260KC	30	450	50	13.3	250
MSA240KC	30	100	50	2.8	250
SA12	20	200	200	3.8	250
NEW SA306	17	60	100	0.9	17
SA60	15	80	250	1.0	140
SA50	7	80	45	0.5	120
NEW SA57	17	60	100	0.9	17
NEW SA303	10	60	100	0.5	10
NEW SA53	10	60	100	0.5	10
NEW SA09	5	40	500	0.3	80

Motor Control Applications

BRUSHLESS DC MOTOR DRIVER

SA306-IHZ

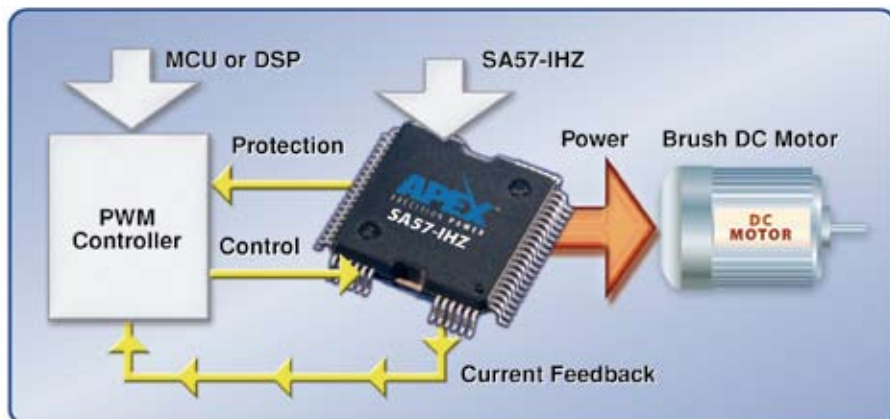
PWM Amplifier
9A, 60V, 64-pin
PowerQuad Package



BRUSH DC MOTOR DRIVE IC

SA57-IHZ

PWM Amplifier
9A, 60V, 64-pin
PowerQuad Package



Apex Precision Power™ High-Voltage Linear Amplifiers

SPECIFICATIONS

Model	Supply Voltage MAX (V)	Output Current MAX (A)	Slew Rate TYP (V/us)	Standby Current MAX (mA)	Power Dissipation MAX (W)
PA89	1200	0.075	30	6	40
PA94	900	0.1	700	24	30
PA95	900	0.1	30	2.2	30
PA97	900	0.01	8	1	5
PA15	450	0.2	20	3	30
PA85	450	0.2	1000	25	30
PA88	450	0.1	30	2	15
PA91	450	0.2	300	14	30
PA98	450	0.2	1000	25	30
PA90	400	0.2	300	14	30
PA92	400	4	50	14	80
PA93	400	8	50	14	125
PA240CC	350	0.06	40	2.5	14
PA241CE	350	0.06	40	2.5	12
PA243DF	350	0.06	40	5	11/20
PA78DK	350	0.15	350	2.5	14
PA78EU	350	0.15	350	2.5	23
PA79DK	350	0.15	350	2.5	26
PA08	300	0.15	30	8.5	17.5
PA82J	300	0.015	20	8.5	11.5
PA83	300	0.075	30	8.5	17.5
PA84	300	0.04	180	7.5	17.5
PA96	300	1.5	250	18	83
PB51	300	1.5	100	18	83
PB58	300	1.5	250	35	70
MP108FD	200	10	170	65	100
MP240FC	200	20	14	25	170
MP38CL	200	7	63	24	125
PA04	200	20	50	90	200
PA52	200	40	50	36	400
PA69EU	200	0.05	200	2.5	23
PA86EU	200	0.15	350	2.5	23
PB50	200	2	100	25	35
NEW PA107	180	1.5	3000	21	60
PA03	150	30	8	300	500
PA81J	150	0.03	20	8.5	11.5
MP111FD	100	15	130	157	170
MP230FC	100	30	15	35	210
MP39CL	100	10	10	24	125
PA05	100	30	100	120	250
PA07	100	5	4	30	67
PA50	100	40	50	36	400

NEW

Apex Precision Power™ High-Voltage PWM Amplifiers

SPECIFICATIONS

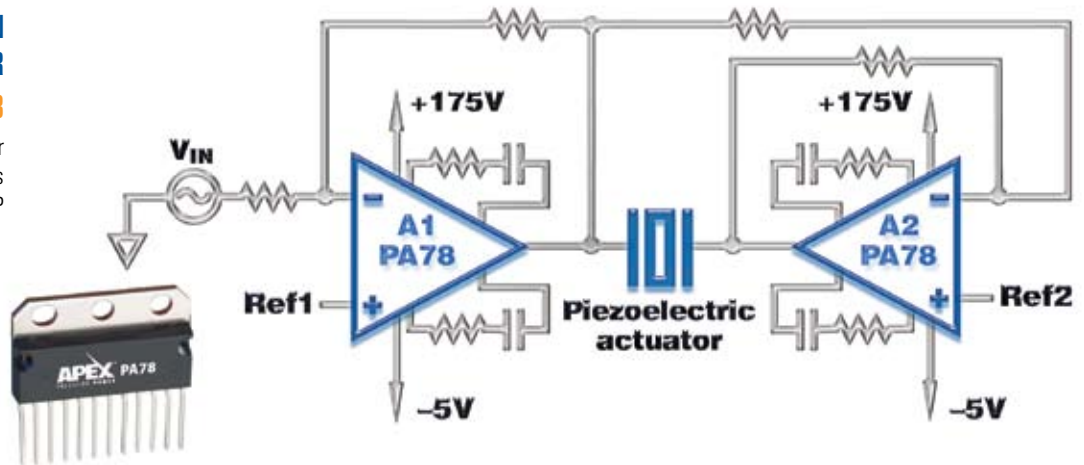
Model	Supply Voltage MAX (V)	Output Current MAX (A)	Switching Frequency MAX (kHz)	Power Delivery MAX (kW)	Power Dissipation MAX (W)
MSA260KC	450	30	50	13.3	300
SA08	450	28	22.5	12.4	250
SA12	200	20	200	3.8	250
MSA240KC	100	30	50	2.8	250
SA01	100	30	42	2.7	185
SA03	100	40	22.5	3.6	250
SA50	80	7	45	0.5	120
SA60	80	15	250	1.0	140
NEW SA303	60	10	100	0.5	10
NEW SA53	60	10	100	0.5	10
NEW SA306	60	17	100	0.9	17
NEW SA57	60	17	100	0.9	17
NEW SA09	40	5	500	0.3	80

Piezo Drive Applications

BRIDGE CONFIGURATION PIEZOELECTRIC ACTUATOR

PA78

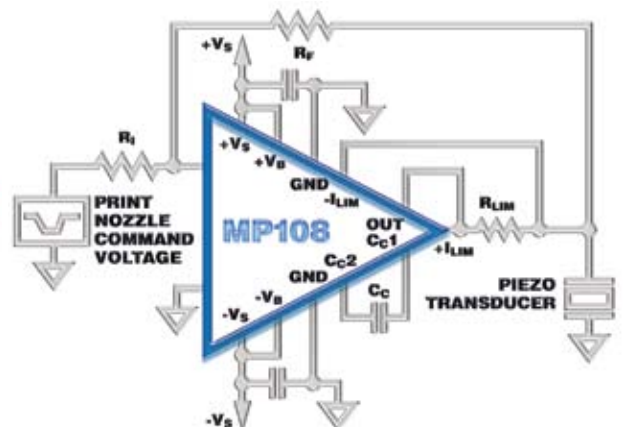
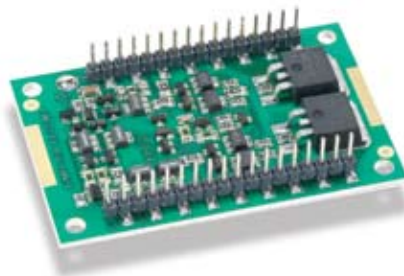
Power Amplifier
175V, 350V/μs
12-pin PowerSIP



PIEZO TRANSDUCER

MP108

Power Amplifier
200V, 170V/μs
Open Frame Package



Apex Precision Power™ High-Speed Linear Amplifiers

SPECIFICATIONS

	Model	Slew Rate TYP (V/us)	Supply Voltage MAX (V)	Output Current MAX (A)	Standby Current MAX (mA)	Power Dissipation MAX (W)
NEW	PA107	3000	180	1.5	21	60
	PA98	1000	450	0.2	25	30
	PA85	1000	450	0.2	25	30
	PA119	900	80	4	120	78
	PA94	700	900	0.1	24	30
	PA79DK	350	350	0.15	2.5	26
	PA78EU	350	350	0.15	2.5	23
	PA78DK	350	350	0.15	2.5	14
	PA86EU	350	200	0.15	2.5	23
NEW	MP400	350	50	0.2	2.5	14.2
	PA91	300	450	0.2	14	30
	PA90	300	400	0.2	14	30
	PB58	250	300	1.5	35	70
	PA96	250	300	1.5	18	83
	PA69EU	200	200	0.05	2.5	23
	PA09	200	80	2	85	78
	PA84	180	300	0.04	7.5	17.5
	MP108FD	170	200	10	65	100
	MP111FD	130	100	15	157	170
	PB51	100	300	1.5	18	83
	PB50	100	200	2	25	35
	PA05	100	100	30	120	250

Apex Precision Power™ Zener Voltage References

VRE100/200 SERIES – HIGH RELIABILITY, HIGH PRECISION

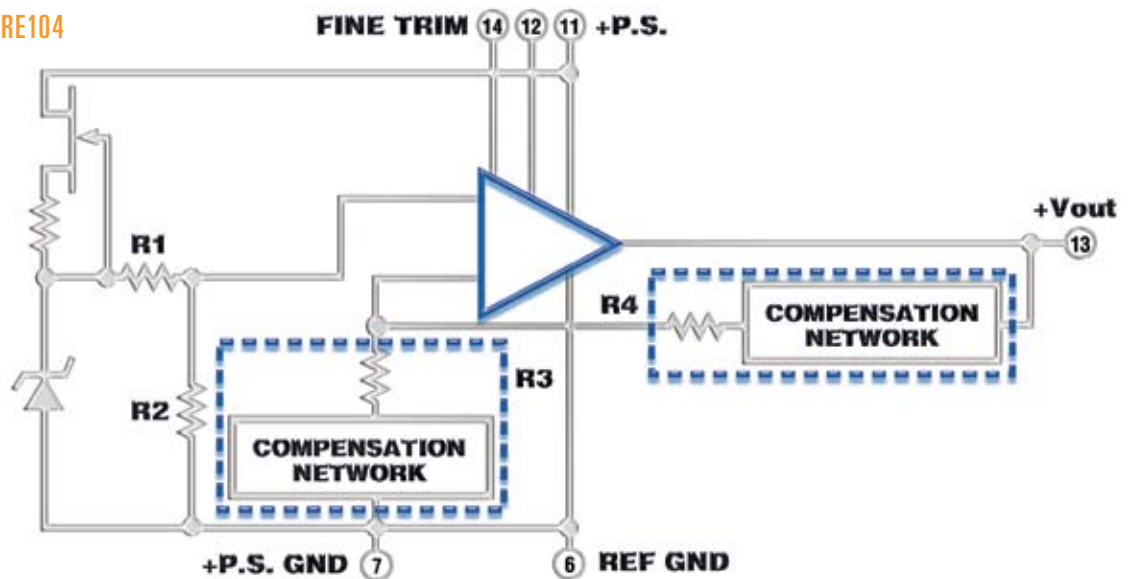
The VRE100/200 series are zener based references that offer either a single or dual output voltages. These are popular in systems where positive and negative reference voltages are required. Packaged in 14-pin DIPs and 20-pin LCCs, many are available with military process options (class H or K). The initial error is .005%, 0.3ppm noise (0.1-10Hz), and 0.5ppm/°C temperature coefficient (tempco). Available in 10.0, 5.0, 4.5, 3.0, and 2.5 volts.



Model	Output (V)	Initial Error (mV)	TempCo (ppm/°C)	Noise (µVpp)	Package	Feature
VRE100/101/102	+10, -10, ±10	0.5, 0.8, 1.0, 1.5	0.3, 0.5	6	DIP14	High Rel
VRE104	4.5	0.4, 0.8	0.4, 0.8	3	DIP14	Cirrus ADCs
VRE107	+5, -5	0.4, 0.8	0.4, 0.8	3	DIP14	High Rel
VRE117	+3	0.2, 0.3	0.3, 0.6	1.5	DIP14	Low Output V
VRE202	2.5	0.2, 0.3	0.4, 0.8	1.5	LCC20	Small Pkg
VRE204	4.5	0.4, 0.8	0.4, 0.8	3	LCC20	Small Pkg
VRE205	5	0.4, 0.8	0.4, 0.8	3	LCC20	Small Pkg
VRE210	10	0.3, 0.4, 0.5, 0.8	0.3, 0.5	6	LCC20	Small Pkg

BLOCK DIAGRAM

VRE104



Apex Precision Power™ Zener Voltage References

VRE300/400 SERIES – LOW COST, HIGH PRECISION

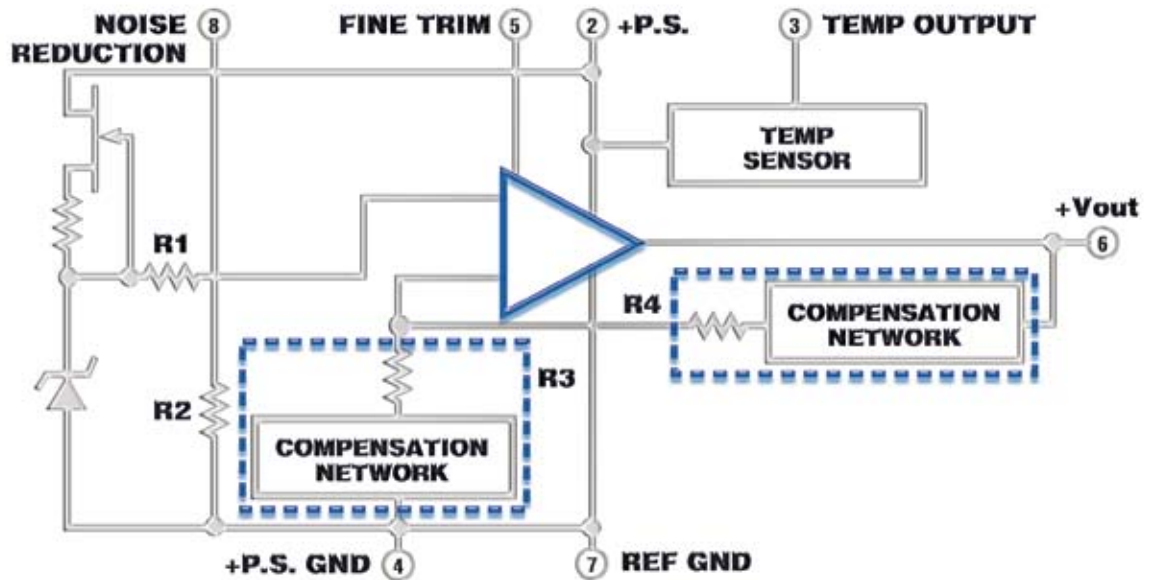
The VRE300/400 series are pin and function compatible with the industry standard 8 or 14-pin format. They offer superior value over any zener based reference on the market. The initial error is .01%, 0.3ppm noise (0.1-10Hz), and 0.6ppm/°C tempco. Available in 10.0, 6.0, 5.0, 4.5 and 2.5 volts.



Model	Output (V)	Initial Error (mV)	TempCo (ppm/°C)	Noise (μVpp)	Package	Feature
VRE302	2.5	0.25, 0.4, 0.5	0.6, 1.0, 2.0	1.5	DIP8, SMT8	Low Cost
VRE304	4.5	0.4, 0.7, 0.9	0.6, 1.0, 2.0	3	SMT8	Low Cost
VRE305	5	0.5, 0.8, 1.0	0.6, 1.0, 2.0	3	DIP8, SMT8	Low Cost
VRE306	6	0.6, 1.0, 1.2	0.6, 1.0, 2.0	3	SMT8	Low Cost
VRE310	10	1.0, 1.6, 2.0	0.6, 1.0, 2.0	6	DIP8, SMT8	Low Cost
VRE405	±5.0	0.5, 0.8, 1.0	0.6, 1.0, 2.0	3	DIP14, SMT14	Dual, Low Cost
VRE410	±10.0	1.0, 1.6, 2.0	0.6, 1.0, 2.0	6	SMT14	Dual, Low Cost

BLOCK DIAGRAM

VRE302



Apex Precision Power™ Zener Voltage References

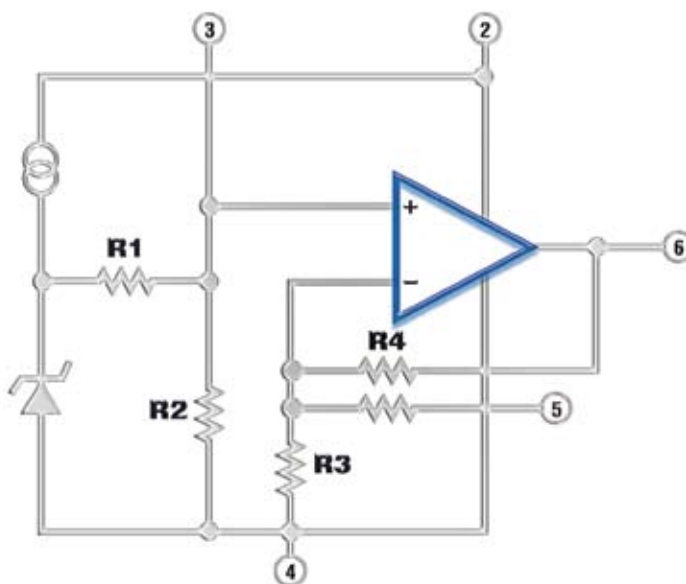
VRE3000/4000 SERIES – LOW COST, HIGH PRECISION

The VRE3000/4000 series are Zener voltage references that operate from a 10V power supply. They are pin and function compatible with the industry standard 8-pin format. They offer superior value over any zener based reference on the market. The initial error is .01%, 0.3ppm noise (0.1-10Hz), and 0.6ppm/°C tempco. Available in 5.0, 4.096, 2.5, and 1.25 volts. Commercial or industrial versions available.



Model	Output (V)	Initial Error (mV)	TempCo (ppm/°C)	Noise (µVpp)	Package	Feature
VRE3025	2.5	0.2, 0.4, 0.5	0.6, 1.0, 2.0	1.5	DIP8, SMT8	+10V Supply
VRE3050	5	0.4, 0.7, 0.9	0.6, 1.0, 2.0	3	SMT8	+10V Supply
VRE4112	1.25	0.625	2.0, 3.0	2.2	SOIC8	Low Cost, 5V Supply
VRE4125	2.5	1.250	1.0, 3.0	2.2	SOIC8	Low Cost, 5V Supply
VRE4141	4.096	2.048	1.0, 3.0	2.2	SOIC8	Low Cost, 5V Supply

BLOCK DIAGRAM VRE3025





CONTACT US

For International technical assistance, please contact the Cirrus Logic office in your region.

For a complete list of Cirrus Logic's sales representatives and distributors, please visit the Contacts area at www.cirrus.com.

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