ANALOG DEVICES

Voltage-Controlled Amplifier/OVCE

SSM-2014*

FEATURES

- **Wide Dynamic Range ..... 116dB (Class AB)**
  ..... 104dB (Class A)
- **12MHz Effective Gain-Bandwidth Product**
- **100dB Open-Loop Gain**
- **0.01% THD Class A (Any Gain/Signal) @ = 10dBV$_{IN/OUT}$**
- **Minimum External Component Count**
- **No Trimming In Many Applications**
- **Low Cost**

Not recommended for new designs; replace with SSM-2018.

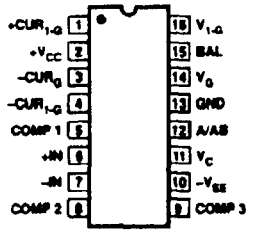
ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... 36V or ±18V
Junction Temperature ..... +150°C
Operating Temperature Range ..... −10°C to +55°C
Storage Temperature Range ..... −65°C to +150°C
Maximum Current Into Any Pin 10mA
Lead Temperature Range (Soldering, 60 sec) ..... +300°C

ORDERING INFORMATION

PACKAGE PLASTIC 16-PIN	OPERATING TEMPERATURE RANGE
SSM2014P	−10°C to +55°C

PIN CONNECTIONS



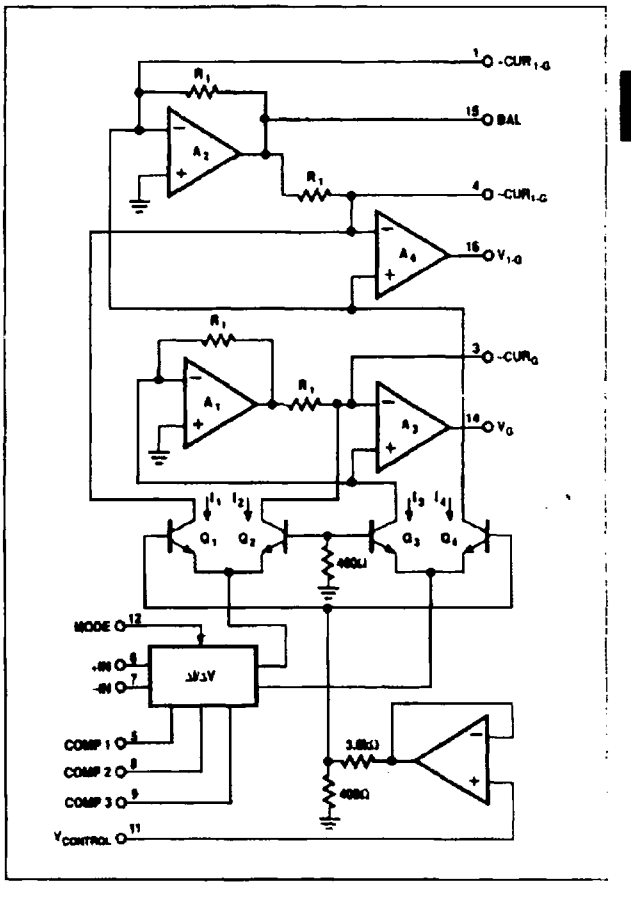
16-PIN PLASTIC DIP (P-Suffix)

DESCRIPTION

The SSM-2014 is an extremely flexible VCA building block that rivals the best monolithic VCAs while approaching the performance of modular devices. This versatile device acts as a VCA or OVCE (Operational Voltage-Controlled Element) and has inputs and outputs that can operate either in the current or voltage domain. To optimize performance at different signal levels, the SSM-2014 features programmable Class A or Class AB operation. This feature, along with the many configurations possible for operation make the SSM-2014 a unique and powerful signal processing tool. The device can be configured as a VCA or VCP (Voltage-Controlled Panner) and can replace a standard VCA and two or more operational amplifiers. Operation as a standard VCA provides up to 50dB gain and excellent specifications at any signal level.

The SSM-2014 is not recommended for new designs or purchases – the SSM-2018 is a pin-compatible upgrade at a lower cost.

BLOCK DIAGRAM



* Protected by U.S. Patents: 4,471,320 and 4, 560, 947. Other Patents pending. Mask work protected under the Semiconductor Chip Protection Act of 1983.

ELECTRICAL CHARACTERISTICS at V_S = ±15V and T_A = ±25°C, unless otherwise specified.

PARAMETER	CONDITIONS	SSM-2014 MIN	TYP	MAX	UNITS
INPUT AMPLIFIER					
Bias Current		–	100	300	nA
Input Offset Current		–	15	30	nA
Input Offset Voltage		–	0.5	2	mV
Input Impedance		0.5	1	–	MΩ
Equivalent Input Noise	@ 1kHz	–	18	–	nV/√Hz
Common-Mode Range		–	+13, -13	–	V
Open-Loop Gain		75	100	–	V/mV
Effective Gain BW Product	VCA Configuration VCP Configuration	– –	12 5	– –	MHz
Slew Rate	VCA Configuration	–	6	–	V/µs
Supply Current - Positive		–	7.5	9	mA
Supply Current - Negative		–	10	12	mA
OUTPUT AMPLIFIERS					
Offset Voltage		–	10	20	mV
Minimum Load Resistor	For Full Output Swing	10	9	–	kΩ
Output Voltage Swing		–	±13.5	–	V
Noise Residual	20kHz Bandwidth	–	8	–	µV
CONTROL PORT					
Bias Current		–	150	300	nA
Input Impedance		–	1	–	MΩ
Gain Constant	Ratio of Outputs	–	–30	–	mV/dB
Gain Constant Temperature Coefficient		–	–3300	–	ppm/°C
Gain Linearity		–	0.5	–	%
Control Feedthrough (Trimmed) Class A Class AB Intermediate	100Hz Sine Wave Applied to Control Port Causing –30dB to +20dB of Gain	 – – –	 2 0.5 1	 – – –	mV
Control Feedthrough (Untrimmed) Class A Class AB (Note 1) Intermediate (Note 1)	100Hz Sine Wave Applied to Control Port Causing –30dB to +20dB of Gain	 – – –	 25 5 15	 75 15 45	mV
Off Isolation	@ 1kHz	100	105	–	dB
Channel Specifications					
Noise - Class A (Note 2)	$R_{PIN\ 12}$ = 33kΩ, 20kHz BW	–	–85	–81	dBV
Noise - Class AB (Note 2)	$R_{PIN\ 12}$ = 330kΩ, 20kHz BW	–	–95	–92	dBV
Noise - Intermediate (Note 2)	$R_{PIN\ 12}$ = 43kΩ, 20kHz BW	–	–88	–85	dBV
THD - A @ A_V = 0dB (Note 3)	$R_{PIN\ 12}$ = 33kΩ	–	0.005	0.02	%
THD - A @ A_V = ±20dB (Note 3)	$R_{PIN\ 12}$ = 33kΩ	–	0.02	0.04	%
THD - AB @ A_V = 0dB (Note 3)	$R_{PIN\ 12}$ = 330kΩ	–	0.02	0.05	%
THD - AB @ A_V = ±20dB (Note 3)	$R_{PIN\ 12}$ = 330kΩ	–	0.06	0.12	%
THD - Intermediate @ A_V = 0dB (Note 3)	$R_{PIN\ 12}$ = 43kΩ	–	0.01	0.03	%
THD - Intermediate @ A_V = ±20dB (Note 3)	$R_{PIN\ 12}$ = 43kΩ	–	0.03	0.06	%

NOTES:

1. Symmetry trim only.
2. Parameter sample lot tested to maximum limits
3. V_{IN} and/or V_{OUT} = +10dBV. Specifications may be subject to change without notice.