## RF COMMUNICATIONS PRODUCTS

# DATA SHEET

## **SA577**

Unity gain level programmable power compandor

Product specification Replaces data of December 15, 1993 IC17 Data Handbook

1997 Nov 07

## **Philips Semiconductors**



**PHILIPS** 

Philips Semiconductors Product specification

## Unity gain level programmable low power compandor

**SA577** 

### **DESCRIPTION**

The SA577 is a unity gain level programmable compandor designed for low power applications. The SA577 is internally configured as an expandor and a compressor to minimize external component count.

### **FEATURES**

- Operating voltage range: 1.8V to 7V
- Low power consumption (1.4mA @ 3.6V)
- 0dB level programmable (10mV<sub>RMS</sub> to 1.0V<sub>RMS</sub>)
- Over 90dB of dynamic range
- Wide input/output swing capability (rail-to-rail)
- Low external component count
- SA577 meets cellular radio specifications
- ESD hardened

### **PIN CONFIGURATION**

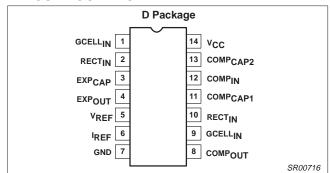


Figure 1. Pin Configuration

### **APPLICATIONS**

- High performance portable communications
- Cellular radio
- Cordless telephone
- Consumer audio
- Wireless microphones
- Modems
- Electric organs
- Hearing aids
- Automatic level control (ALC)

### ORDERING INFORMATION

| DESCRIPTION                       | TEMPERATURE RANGE | ORDER CODE | DWG #    |
|-----------------------------------|-------------------|------------|----------|
| 14-Pin Plastic Small Outline (SO) | −40 to +85°C      | SA577D     | SOT108-1 |

## **ABSOLUTE MAXIMUM RATINGS**

| SYMBOL           | PARAMETER                           | RATING      | UNITS |  |
|------------------|-------------------------------------|-------------|-------|--|
| 31WBOL           | FARAMETER                           | SA577       | ONITS |  |
| V <sub>CC</sub>  | Supply voltage                      | 8           | V     |  |
| T <sub>A</sub>   | Operating ambient temperature range | -40 to +85  | °C    |  |
| T <sub>STG</sub> | Storage temperature range           | -65 to +150 | °C    |  |
| $\theta_{JA}$    | Thermal impedance SO                | 125         | °C/W  |  |

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### **ELECTRICAL CHARACTERISTICS**

 $T_{A}=25^{\circ}C,\ V_{CC}=3.6VDC,\ compandor\ 0dB\ level=-20dBV=100mV_{RMS}, output\ load\ R_{L}=10k\Omega,\ Freq=1kHz,\ unless\ otherwise\ specified.$ R1, R2 and R3 are 1% resistors.

|                  |  |                                    |      | LIMITS                |     |          |
|------------------|--|------------------------------------|------|-----------------------|-----|----------|
| SYMBOL           | PARAMETER                                      | TEST CONDITIONS                    |      | UNITS                 |     |          |
|                  |  |                                    | MIN  | TYP                   | MAX | 1        |
| V <sub>CC</sub>  | Supply voltage <sup>1</sup>                    |                                    | 2    | 3.6                   | 7   | V        |
| Icc              | Supply current                                 | No signal $R_2$ = 100kΩ            |      | 1.4                   | 2   | mA       |
| V <sub>REF</sub> | Reference voltage <sup>2</sup>                 | V <sub>CC</sub> = 3.6V             | 1.7  | 1.8                   | 1.9 | V        |
| $R_L$            | Summing amp output load                        |                                    | 10   |                       |     | kΩ       |
| THD              | Total harmonic distortion 1kHz, 0dB, BW = 3.5k |                                    |      | 0.25                  | 1.5 | %        |
| E <sub>NO</sub>  | Expandor output noise voltage                  | BW = $20kHz$ , $R_S = 0\Omega$     |      | 10                    | 25  | μV       |
| 0dB              | Unity gain level                               | 0dB at 1kHz                        | -1.5 | 0.18                  | 1.5 | dB       |
|                  | Programmable range <sup>3</sup>                | R1 = R3 = 18.7kΩ, R2 = 24.3kΩ      |      | 0                     |     |          |
|                  |  | R1 = R3 = 22.6kΩ, R2 = $100$ kΩ    |      | -10                   |     | dBV      |
|                  |  | R1 = R3 = $7.15$ kΩ, R2 = $100$ kΩ |      | -20                   |     | d abv    |
|                  |  | R1 = R3 = 1.33kΩ, R2 = 200kΩ       |      | -40                   |     | 1        |
| Vos              | Output voltage offset                          | No signal                          | -150 | 1                     | 150 | mV       |
|                  | Expandor output DC shift                       | No signal to 0dB                   | -100 | 7                     | 100 | mV       |
|                  | Tracking error relative to 0dB output          | -20dB expandor                     | -1.0 | 0.3                   | 1.0 | dB       |
|                  | Crosstalk, COMP to EXP                         | 1kHz, 0dB, C <sub>REF</sub> = 10μF |      | -80                   | -65 | dB       |
|                  | Output swing low                               |                                    |      | 0.2                   |     | .,       |
| Vo               | Output swing high                              |                                    |      | V <sub>CC</sub> - 0.2 |     | <b>-</b> |

- Operation down to V<sub>CC</sub> = 1.8V is possible, see application note AN1762.
  Reference voltage, V<sub>REF</sub>, is typically at 1/2 V<sub>CC</sub>.
  Unity gain level can be adjusted CONTINUOUSLY between -40dBV = 10mV<sub>RMS</sub> and 0dBV = 1.0V<sub>RMS</sub>. For details see application note AN1762.

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## **BLOCK DIAGRAM and TEST AND APPLICATION CIRCUIT**

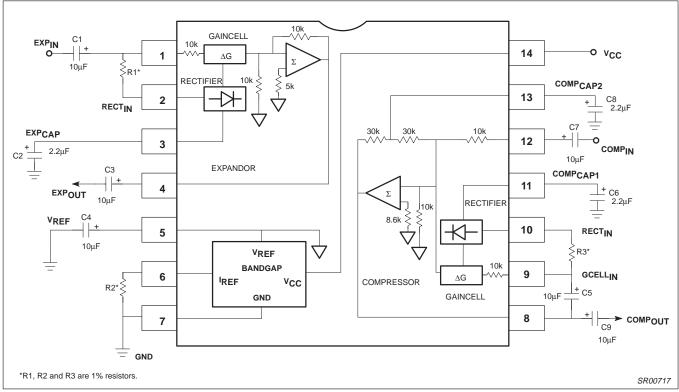


Figure 2. Block Diagram and Test and Application Circuit

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### TYPICAL PERFORMANCE CHARACTERISTICS

 $V_{CC} = 3.6V$ ,  $T_A = 25^{\circ}C$ ,  $R1 = R3 = 7.15k\Omega$ ,  $R2 = 100k\Omega$ , OdB level = 100mV, Freq. = 1kHz

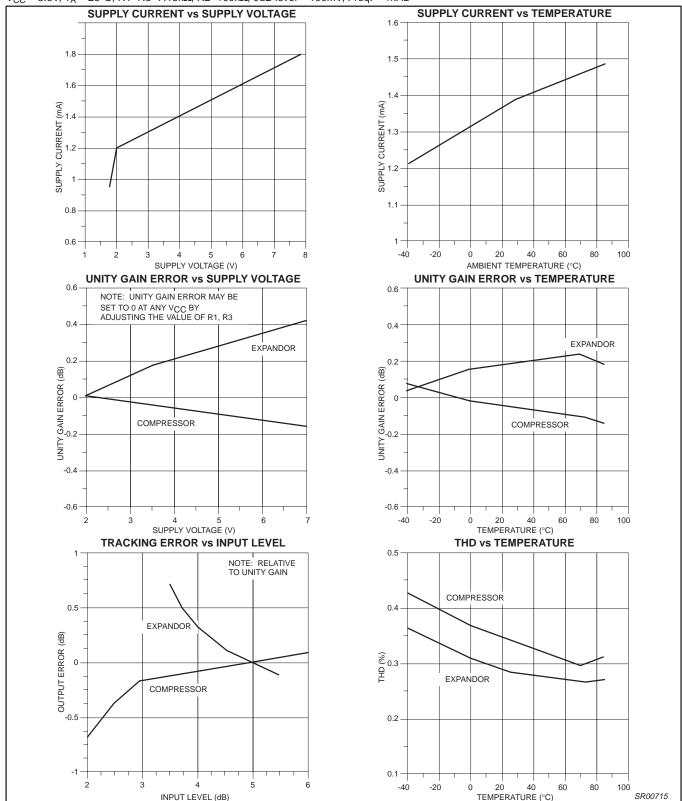


Figure 3. Typical Performance Characteristics

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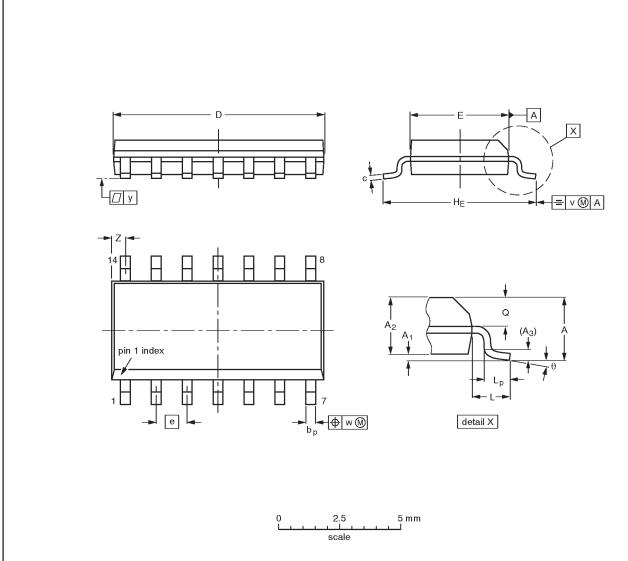
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## SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



## DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT   | A<br>max. | Α1               | A <sub>2</sub> | <b>A</b> <sub>3</sub> | bp           | С                | D <sup>(1)</sup> | E <sup>(1)</sup> | е     | HE           | L     | Lp             | Ø          | v    | w    | у     | Z <sup>(1)</sup> | θ  |
|--------|-----------|------------------|----------------|-----------------------|--------------|------------------|------------------|------------------|-------|--------------|-------|----------------|------------|------|------|-------|------------------|----|
| mm     | 1.75      | 0.25<br>0.10     | 1.45<br>1.25   | 0.25                  | 0.49<br>0.36 | 0.25<br>0.19     | 8.75<br>8.55     | 4.0<br>3.8       | 1.27  | 6.2<br>5.8   | 1.05  | 1.0<br>0.4     | 0.7<br>0.6 | 0.25 | 0.25 | 0.1   | 0.7<br>0.3       | 8° |
| inches | 0.069     | 0.0098<br>0.0039 | 0.057<br>0.049 | 0.01                  |              | 0.0098<br>0.0075 |                  | 0.16<br>0.15     | 0.050 | 0.24<br>0.23 | 0.041 | 0.039<br>0.016 |            | 0.01 | 0.01 | 0.004 | 0.028<br>0.012   | 0° |

### Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE  |          | REFER     | RENCES | EUROPEAN   | ISSUE DATE                      |  |
|----------|----------|-----------|--------|------------|---------------------------------|--|
| VERSION  | IEC      | IEC JEDEC |        | PROJECTION | ISSUE DATE                      |  |
| SOT108-1 | 076E06\$ | MS-012AB  |        |            | <del>91-08-13</del><br>95-01-23 |  |

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| DEFINITIONS               |                        |   |  |  |  |  |
|---------------------------|------------------------|---|--|--|--|--|
| Data Sheet Identification | Product Status         | Definition  |  |  |  |  |
| Objective Specification   | Formative or in Design | This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.  |  |  |  |  |
| Preliminary Specification | Preproduction Product  | This data sheet contains preliminary data, and supplementary data will be published at a later date. Phillips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |  |  |  |  |
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