

# 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**

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 expander 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 (10mVRMS to 1.0VRMS)
- 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

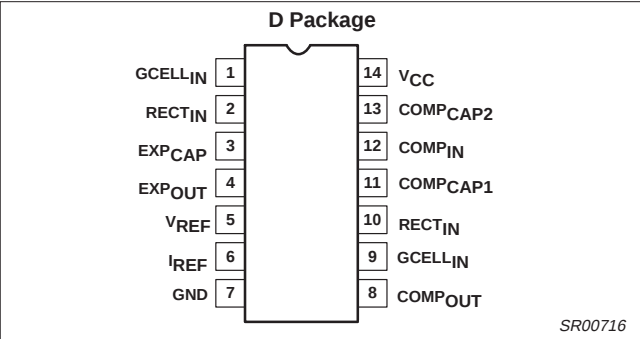


Figure 1. Pin Configuration

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 |
|--------|-------------------------------------|-------------|-------|
|        |                                     | SA577       |       |
| VCC    | Supply voltage                      | 8           | V     |
| TA     | Operating ambient temperature range | −40 to +85  | °C    |
| TSTG   | Storage temperature range           | −65 to +150 | °C    |
| θJA    | Thermal impedance SO                | 125         | °C/W  |

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## ELECTRICAL CHARACTERISTICS

$T_A = 25^\circ\text{C}$ ,  $V_{CC} = 3.6\text{VDC}$ , compandor 0dB level =  $-20\text{dBV} = 100\text{mV}_{\text{RMS}}$ , output load  $R_L = 10\text{k}\Omega$ , Freq =  $1\text{kHz}$ , unless otherwise specified.  $R_1$ ,  $R_2$  and  $R_3$  are 1% resistors.

| SYMBOL           | PARAMETER                             | TEST CONDITIONS                     | LIMITS |                       |     | UNITS |
|------------------|---------------------------------------|-------------------------------------|--------|-----------------------|-----|-------|
|                  |                                       |                                     | SA577  |                       |     |       |
|                  |                                       |                                     | MIN    | TYP                   | MAX |       |
| V <sub>CC</sub>  | Supply voltage <sup>1</sup>           |                                     | 2      | 3.6                   | 7   | V     |
| I <sub>CC</sub>  | Supply current                        | No signal<br>R <sub>2</sub> = 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 <sub>L</sub>   | Summing amp output load               |                                     | 10     |                       |     | kΩ    |
| THD              | Total harmonic distortion             | 1kHz, 0dB, BW = 3.5kHz              |        | 0.25                  | 1.5 | %     |
| E <sub>NO</sub>  | Expandor output noise voltage         | BW = 20kHz, R <sub>S</sub> = 0Ω     |        | 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                     |     | dBV   |
|                  |                                       | R1 = R3 = 22.6kΩ, R2 = 100kΩ        |        | −10                   |     |       |
|                  |                                       | R1 = R3 = 7.15kΩ, R2 = 100kΩ        |        | −20                   |     |       |
|                  |                                       | R1 = R3 = 1.33kΩ, R2 = 200kΩ        |        | −40                   |     |       |
| V <sub>OS</sub>  | 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    |
| V <sub>O</sub>   | Output swing low                      |                                     |        | 0.2                   |     | V     |
|                  | Output swing high                     |                                     |        | V <sub>CC</sub> − 0.2 |     |       |

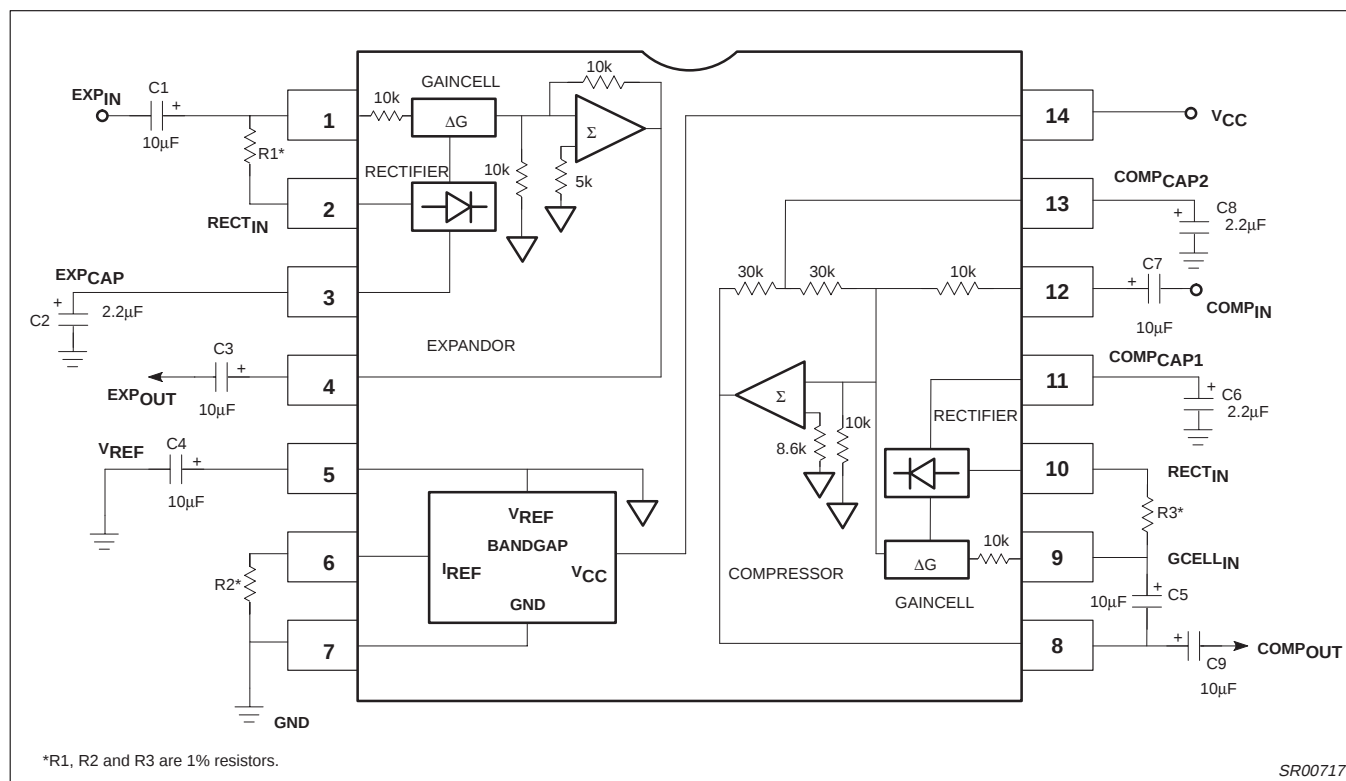
### NOTE:

1. Operation down to  $V_{CC} = 1.8\text{V}$  is possible, see application note AN1762.
2. Reference voltage,  $V_{REF}$ , is typically at  $1/2 V_{CC}$ .
3. Unity gain level can be adjusted CONTINUOUSLY between  $-40\text{dBV} = 10\text{mV}_{\text{RMS}}$  and  $0\text{dBV} = 1.0\text{V}_{\text{RMS}}$ . For details see application note AN1762.

## Unity gain level programmable low power compandor

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## BLOCK DIAGRAM and TEST AND APPLICATION CIRCUIT



SR00717

Figure 2. Block Diagram and Test and Application Circuit

## Unity gain level programmable low power compandor

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## TYPICAL PERFORMANCE CHARACTERISTICS

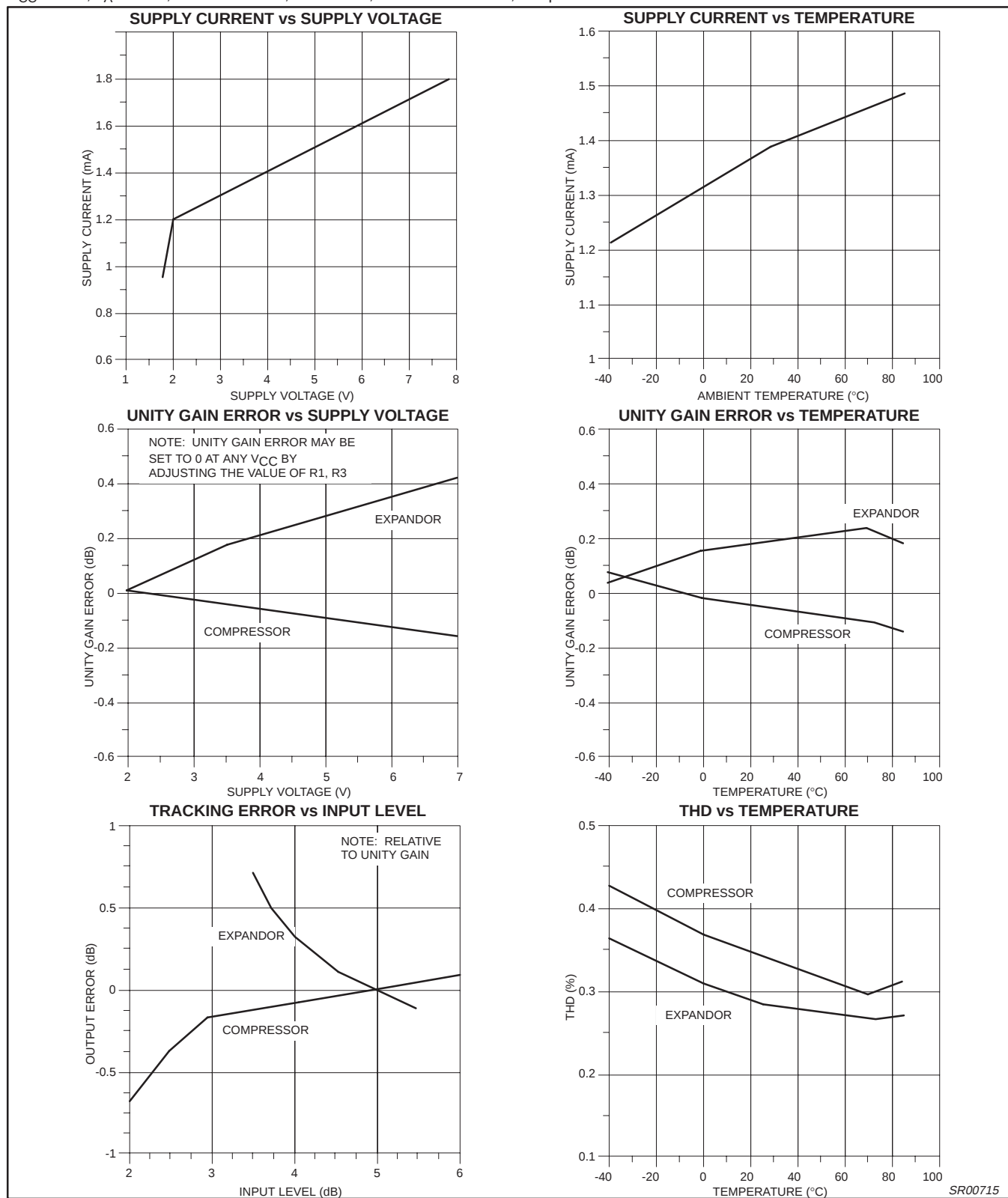
 $V_{CC} = 3.6V$ ,  $T_A = 25^\circ C$ ,  $R_1=R_3=7.15k\Omega$ ,  $R_2=100k\Omega$ , 0dB level = 100mV, Freq. = 1kHz


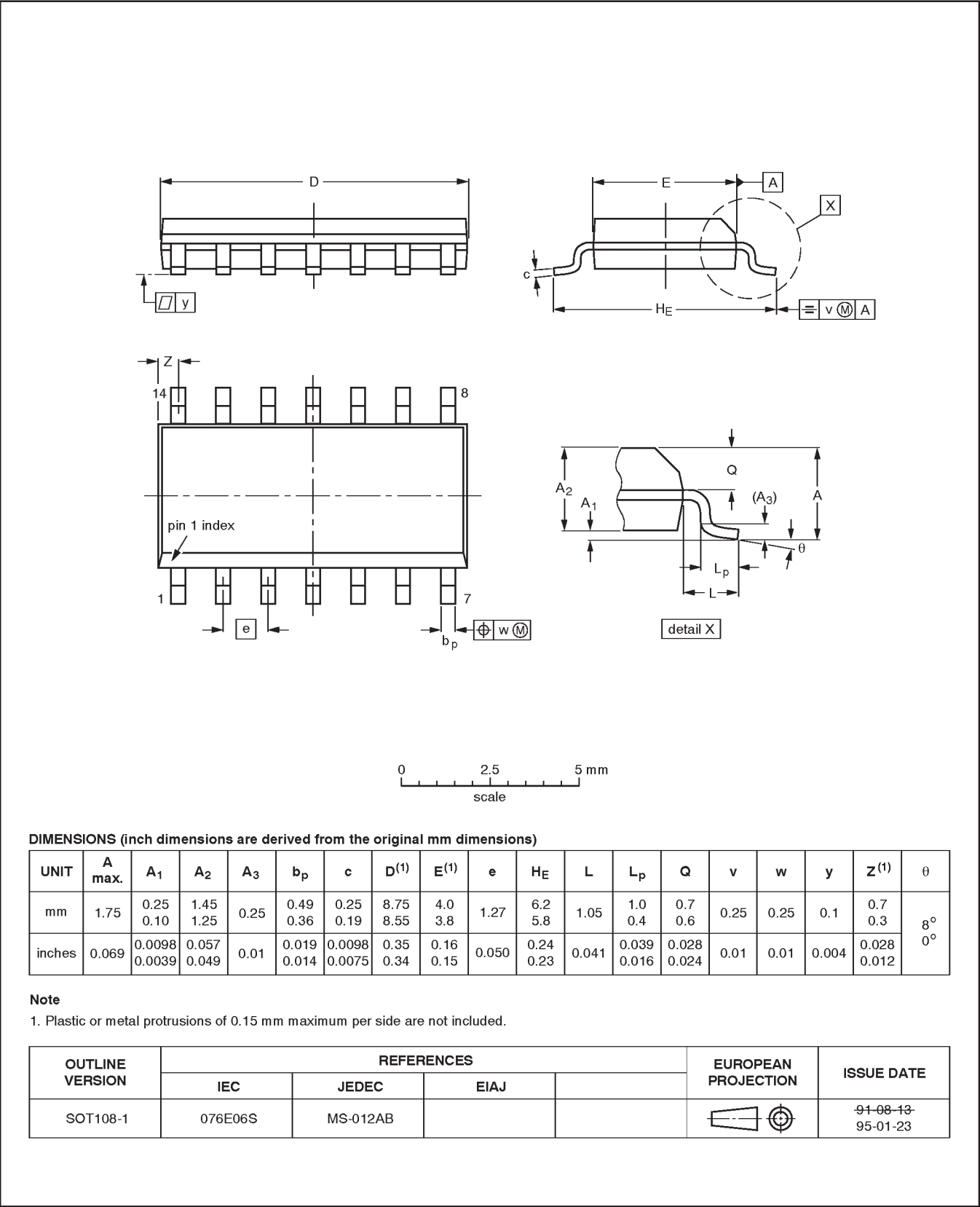
Figure 3. Typical Performance Characteristics

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

SOT108-1



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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. Philips 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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