

## 1.1-GHz Prescaler for PLLs in TV, CATV and SAT TV Tuners

**Technology:** Bipolar

### Features

- U813BS ECL output stage
- U813BSE emitter-follower output stage
- 3 scaling factors 64/128/256, programmable at Pin 5
- High input sensitivity
- Low output impedance
- Low power consumption
- Pin-compatible to the U6xxB-series except Pin 5
- Electrostatic protection according to MIL-STD. 883

### Case

|                           |                         |
|---------------------------|-------------------------|
| 8-pin dual-inline plastic | (U813BS, U813BSE)       |
| 8-pin SO plastic          | (U813BS-FP, U813BSE-FP) |
| 6-pin SIP plastic         | (U813BS-SP, U813BSE-SP) |

### Block Diagram

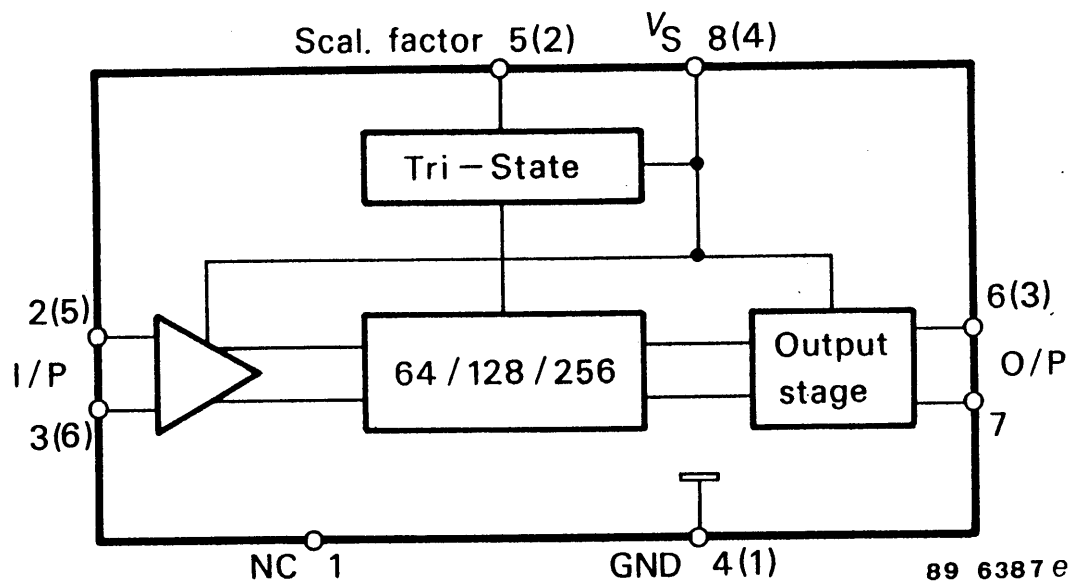


Figure 1. Block diagram

## Absolute Maximum Ratings

Reference point pin 4 (1)

| Parameters                                | Symbol    | Value       | Unit |
|-------------------------------------------|-----------|-------------|------|
| Supply voltage Pin 8 (4)                  | $V_S$     | 6           | V    |
| Input-voltage range Pin 2, 3, 5 (2, 5, 6) | $V_i$     | 0 to $V_S$  | V    |
| Junction temperature                      | $T_j$     | 125         | °C   |
| Storage-temperature range                 | $T_{stg}$ | −40 to +125 | °C   |
| Ambient-temperature range                 | $T_{amb}$ | −25 to +70  | °C   |

## Thermal Resistance

| Parameters            | Symbol     | Value | Unit |
|-----------------------|------------|-------|------|
| Junction ambient DIP8 | $R_{thJA}$ | 100   | K/W  |
| SIP6                  |            | 100   |      |
| SO8                   |            | 175   |      |

### Note:

The device is self-oscillating without input signal

## Pin Description (Dip8, SO8)

| Pin  | Function          |
|------|-------------------|
| 1    | Not connected     |
| 2, 3 | Input             |
| 4    | Ground            |
| 5    | Switch 64/128/256 |
| 6, 7 | Output            |
| 8    | $V_S$             |

## Pin Description (SIP6)

| Pin | Function          |
|-----|-------------------|
| 1   | Ground            |
| 2   | Switch 64/128/256 |
| 3   | Output            |
| 4   | $V_S$             |
| 5,6 | Input             |

### Notes:

Pin numbers without brackets apply to DIP8 and SO8 package,  
Pin numbers with brackets to SIP6

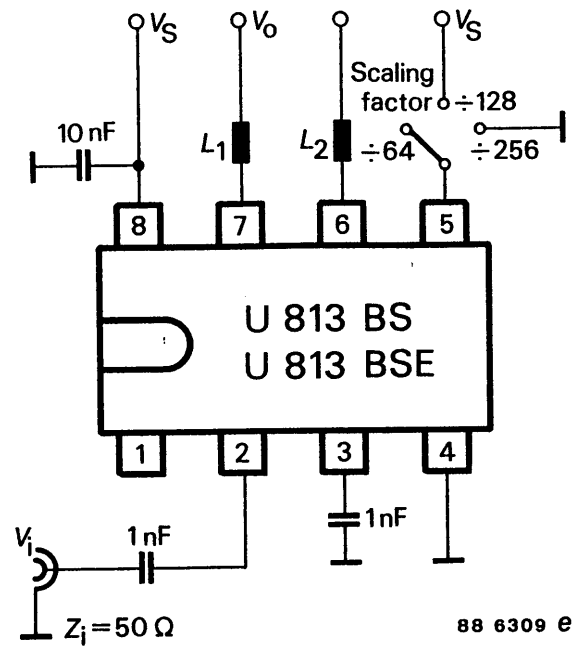
RMS voltage calculated from the available power measured

## Electrical Characteristics

$V_S = 4.5$  to  $5.5$  V,  $T_{amb} = 0$  to  $+70^\circ\text{C}$ , referred to test circuit, unless otherwise specified

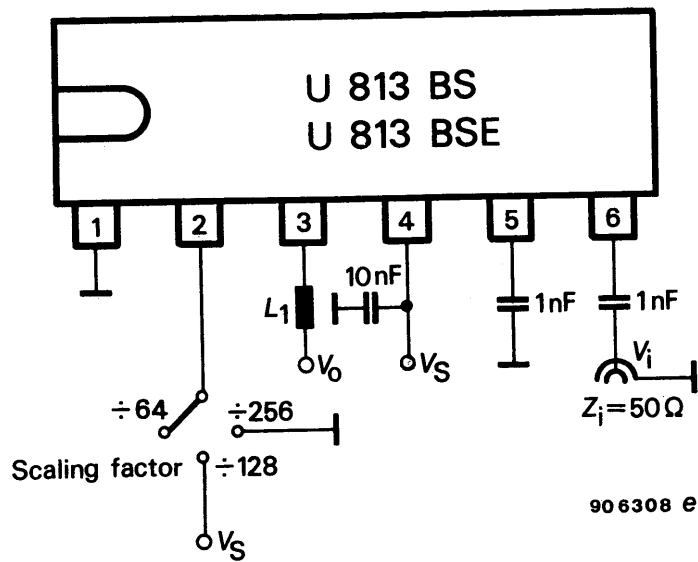
| Parameters                 | Test Conditions / Pin                                             | Symbol                   | Min.        | Typ. | Max. | Unit     |
|----------------------------|-------------------------------------------------------------------|--------------------------|-------------|------|------|----------|
| Supply current             | $V_S = 5$ V<br><b>U813BS</b> Pin 8 (4)                            | $I_S$                    |             | 35   | 45   | mA       |
|                            | <b>U813BSE</b> Pin 8 (4)                                          | $I_S$                    |             | 38   | 50   | mA       |
| Input sensitivity          | $R_G = 50\ \Omega$<br>$f_i = 70$ to $1000$ MHz<br>Pin 2, 3 (5, 6) | $V_i$                    |             |      | 10   | mV       |
|                            | $f_i = 1000$ to $1100$ MHz<br>Pin 2, 3 (5, 6)                     | $V_i$                    |             |      | 15   | mV       |
| Large-signal compatibility | $R_G = 50\ \Omega$<br>Pin 2, 3 (5, 6)                             | $V_i$                    | 300         |      |      | mV       |
| Frequency range            |                                                                   | $f_{imin}$<br>$f_{imax}$ | <br>1100    |      | 70   | <br>MHz  |
| <b>Output stage</b>        |                                                                   |                          |             |      |      |          |
| a. Balanced ECL output     |                                                                   |                          |             |      |      |          |
| Voltage swing each output  | $R_L = 10\ \text{k}/13\ \text{pF}$<br>Pin 6, 7 (3)                | $V_O$                    | 0.8         |      |      | $V_{pp}$ |
| Output impedance           | Pin 6, 7 (3)                                                      | $Z_O$                    |             | 500  |      | $\Omega$ |
| b. Emitter follower        |                                                                   |                          |             |      |      |          |
| Voltage swing each output  | $R_L = 10\ \text{k}/13\ \text{pF}$<br>Pin 6, 7 (3)                | $V_O$                    | 1           |      |      | $V_{pp}$ |
| Output impedance           | Pin 6, 7 (3)                                                      | $Z_O$                    |             | 200  |      | $\Omega$ |
| Switching voltage for      | $\therefore 64$ Pin 5 (2)                                         | $V_{SF}$                 |             | open |      |          |
|                            | $\therefore 128$ Pin 5 (2)                                        | $V_{SF}$                 | $V_S - 0.5$ |      |      | V        |
|                            | $\therefore 256$ Pin 5 (2)                                        | $V_{SF}$                 |             | 0    | 0.5  | V        |

## Test Circuits



DIP 8/SO 8

Figure 2.

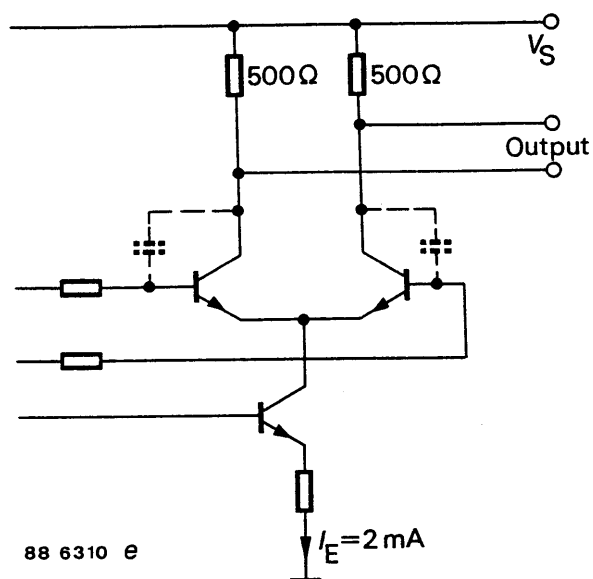


SIP 6

$L_1 = L_2 = 150 \text{ nH}$  (6 turns CuL 0.45 mm  $\varnothing$  on 4 mm  $\varnothing$ )

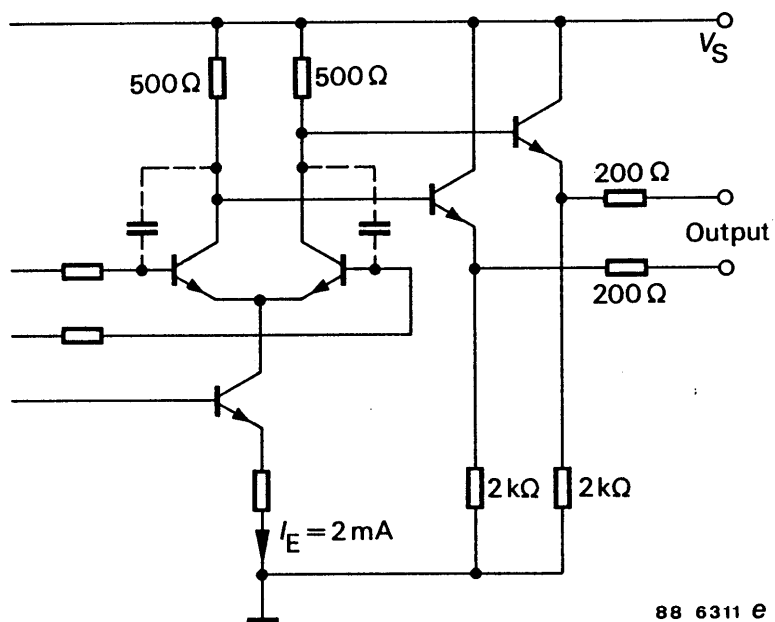
Figure 3.

## Output Circuits



ECL output (U 813 BS)

Figure 4.



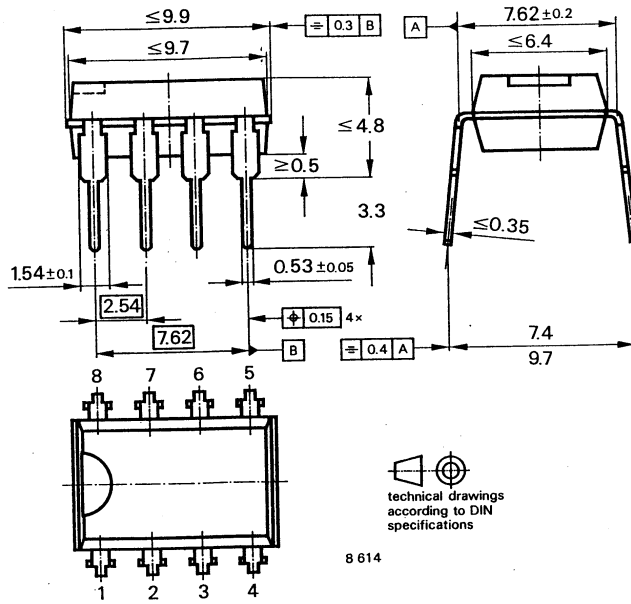
Emitter follower output (U 813 BSE)

Figure 5.

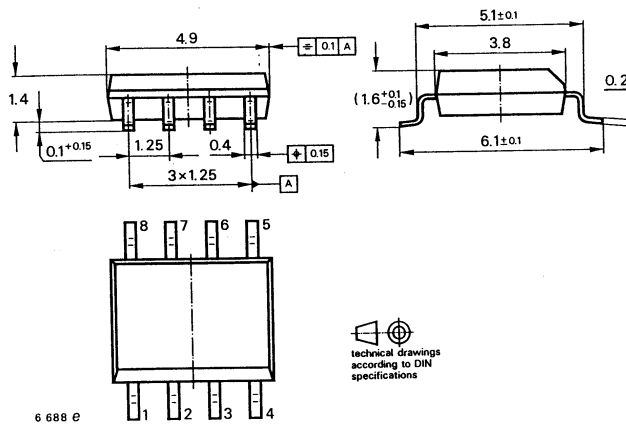
# U813BS/U813BSE

**TEMIC**  
Semiconductors

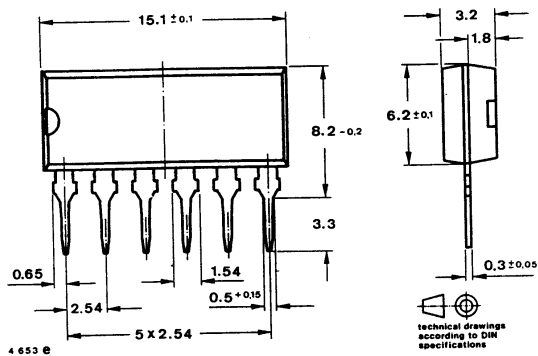
### Dimensions in mm



**Case**  
DIP 8-leads



Case  
SO 8  
(SOT 96 A)



Case  
SIP 6  
6-leads

## **Ozone Depleting Substances Policy Statement**

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**TEMIC TELEFUNKEN microelectronic GmbH** semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**TEMIC** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use TEMIC products for any unintended or unauthorized application, the buyer shall indemnify TEMIC against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

TEMIC TELEFUNKEN microelectronic GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany  
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423