

## Reference voltage source

### SPECIFICATION

#### 1 FEATURES

- SMIC CMOS 0.18 $\mu\text{m}$
- Output voltage 1.2 V
- Temperature-compensated voltage in a wide temperature range
- Usage of bipolar pnp transistors
- Bipolar diode characteristics control
- Low current consumption
- Small area

#### 2 APPLICATION

The output reference voltage can be used for both analog and digital blocks. The main application:

- Supply voltage stabilization systems
- Comparison and detection systems
- System-on-chip for different purposes
- Measurement and calibration systems
- Navigation systems
- Technological research of microelectronic components

#### 3 OVERVIEW

Reference voltage source forms temperature-compensated voltage level equal to the width of the band gap of silicon due to mutual compensation of temperature dependence of bipolar diodes and resistors.

The block is fabricated on SMIC CMOS 0.18 $\mu\text{m}$  technology.

#### 4 STRUCTURE

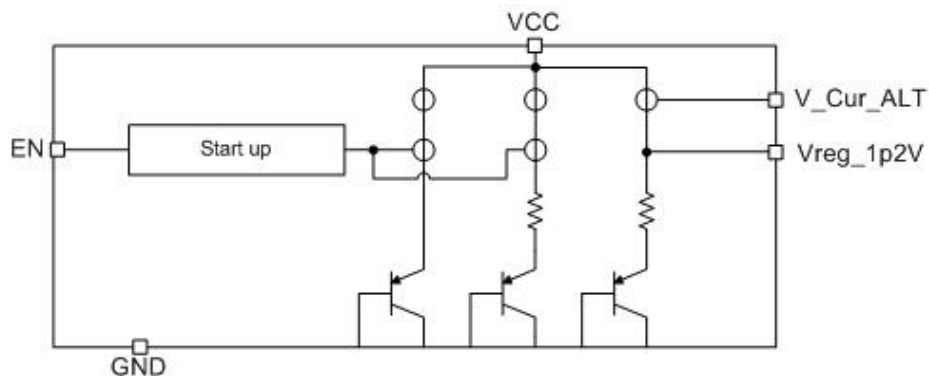


Figure 1: Reference voltage source structure.

## 5 PIN DESCRIPTION

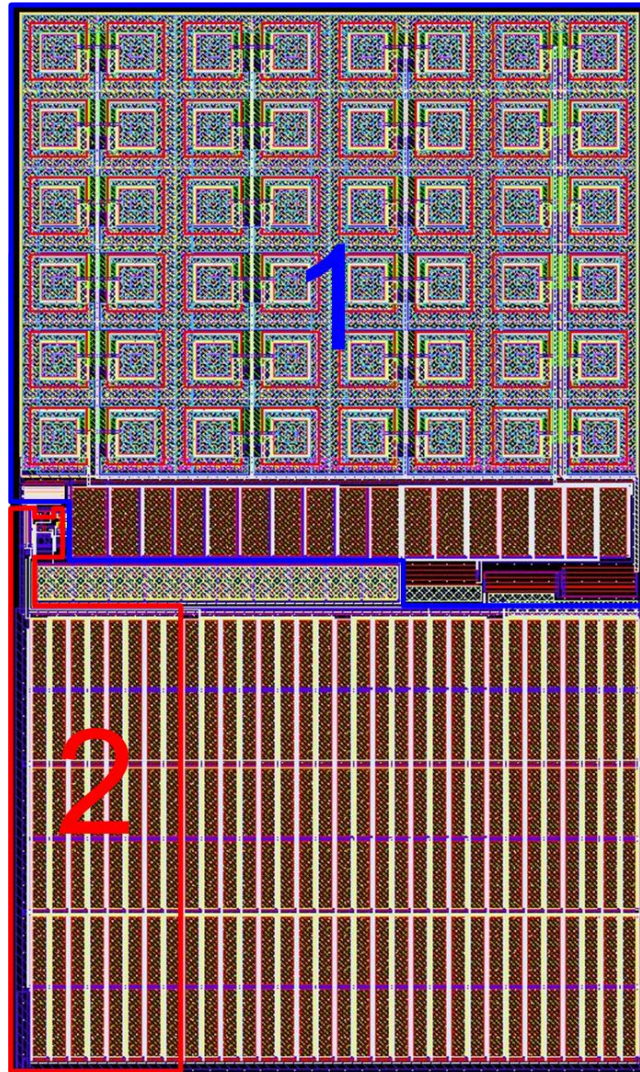
| Name      | Direction | Description       |
|-----------|-----------|-------------------|
| EN        | I         | Enable/disable    |
| V_Cur_ALT | O         | Current rise      |
| VReg_1p2V | O         | Reference voltage |
| VCC       | IO        | Supply voltage    |
| GND       | IO        | Ground            |

## 6 LAYOUT DESCRIPTION

The block dimensions are given in the table 1.

**Table 1:** Block dimensions.

| Dimension | Value  | Unit          |
|-----------|--------|---------------|
| Height    | 312.84 | $\mu\text{m}$ |
| Width     | 184.47 | $\mu\text{m}$ |



**Figure 2:** Device layout view.

1. Temperature-compensated reference voltage source bipolar base
2. Start up circuit

## 7 OPERATING CHARACTERISTICS

### 7.1 TECHNICAL CHARACTERISTICS

Technology \_\_\_\_\_ SMIC CMOS 0.18 $\mu$ m  
 Status \_\_\_\_\_ silicon proven  
 Area \_\_\_\_\_ 0.06mm<sup>2</sup>

### 7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for  $V_{cc} = 2.7 \div 3.6$  V and  $T = -45 \div +90$  °C. Typical values are at  $V_{cc} = 3.15$  V and  $T = +27$ ° C, unless otherwise specified.

| Parameter                             | Symbol           | Condition          | Value        |       |       | Unit    |
|---------------------------------------|------------------|--------------------|--------------|-------|-------|---------|
|                                       |                  |                    | min          | typ   | max   |         |
| Supply voltage                        | $V_{cc}$         | -                  | 2.7          | 3.15  | 3.6   | V       |
| Operating temperature range           | T                | -                  | -45          | 27    | 90    | °C      |
| Reference voltage                     | $V_{ref}$        | -                  | 1.2          | 1.22  | 1.25  | V       |
| Current consumption                   | $I_{cc}$         | -                  | -            | 46.42 | 66.35 | $\mu$ A |
| Current consumption in a standby mode | $I_{stb}$        | -                  | -            | 0.01  | -     | nA      |
| Reference voltage deviation           | $\Delta V_{ref}$ | -                  | -            | 2.19  | -     | %       |
| Temperature error                     | $\Delta T$       | -                  | -            | 0.5   | -     | %       |
| Input logic-high level                | $V_{IH}$         | For digital inputs | $0.7 V_{cc}$ | -     | 3.6   | V       |
| Input logic-low level                 | $V_{IL}$         |                    | -0.25        | -     | 0.3   | V       |

## 8 DELIVERABLES

IP contents:

- Schematic or NetList
- Layout or blackbox
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation