Bandgap voltage reference

SPECIFICATION

1   FEATURES

- SMIC CMOS 0.18µm
- Output voltage 1.2 V
- Temperature-compensated voltage in a wide temperature range
- Low current consumption
- Small area
- Bipolar diode characteristics control
- Portable to other technologies (upon request)

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
- Technological research of microelectronic components
- Navigation systems

3   OVERVIEW

Bandgap voltage reference 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.

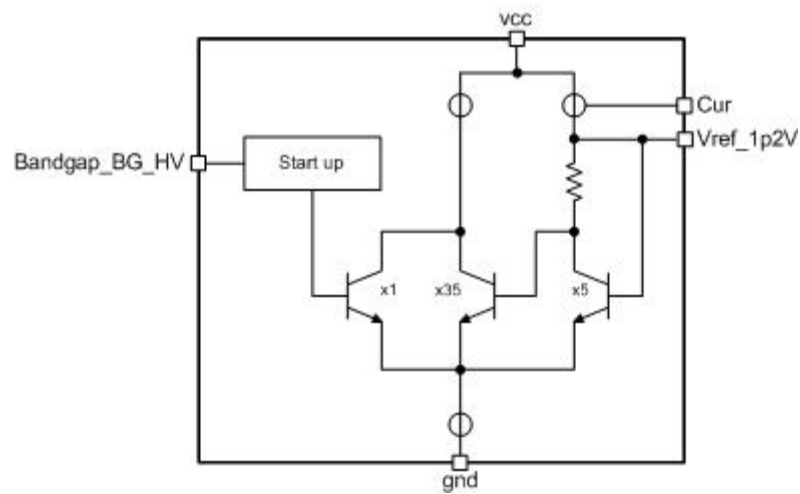The block is fabricated on SMIC CMOS 0.18µm technology.

4 STRUCTURE

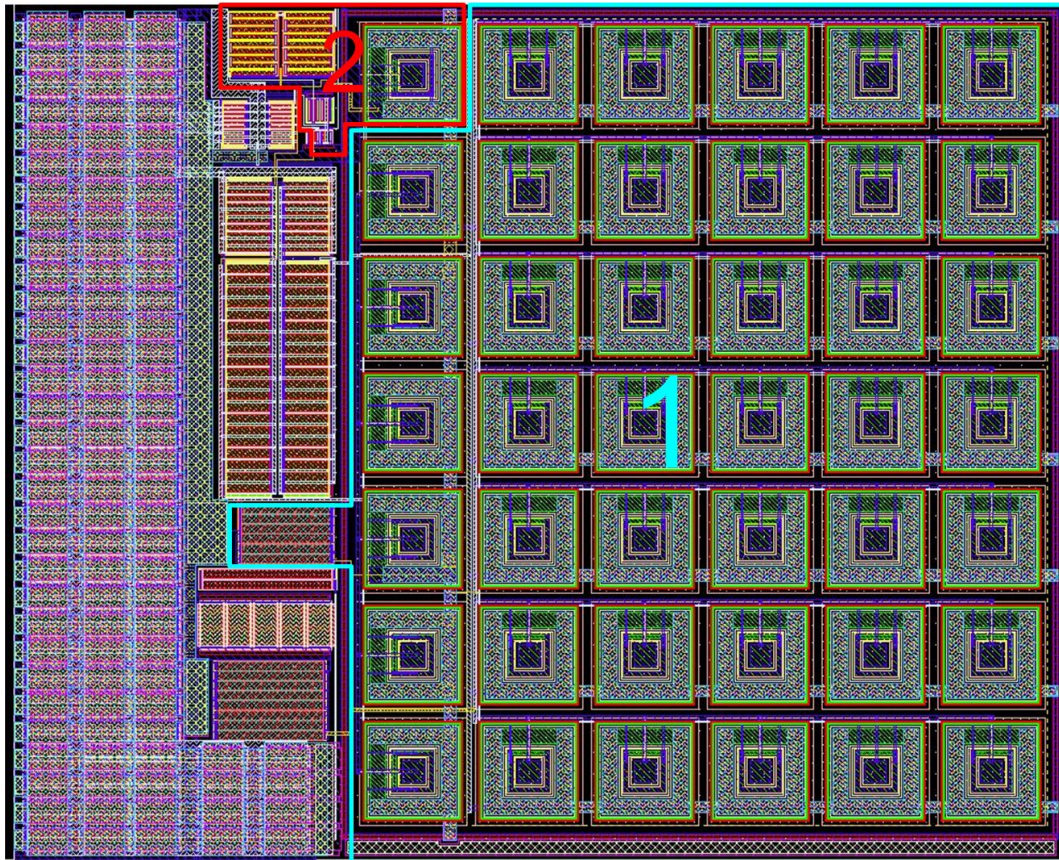Figure 1: Bandgap voltage reference structure.

5 PIN DESCRIPTION

Name	Direction	Description
Bandgap_BG_HV	I	Enable/ disable
Cur	O	Current rise
Vref_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	198.0	µm
Width	243.54	µm

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 0.18μm
Status _____ silicon proven
Area _____ 0.05mm^2

7.2   ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for V_{cc} = 2.7 ÷ 3.6 V and T = -45 ÷ +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	ºC
Reference voltage	V_{ref}	-	1.16	1.19	1.23	V
Current consumption	I_{cc}	-	-	17.78	26.10	μA
Current consumption in a standby mode	I_{stb}	-	-	0.01	-	nA
Reference voltage deviation	ΔV_{ref}	-	-	3.17	-	%
Temperature error	ΔT	-	-	0.71	-	%
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