
Bandgap voltage reference

SPECIFICATION

1 FEATURES

- TSMC BiCMOS 0.18 μm
- Output voltage 1.16 V
- Compensated in wide temperature range
- Based on n-p-n bipolar transistors
- Low current consumption
- Small area
- Supported foundries: TSMC, UMC, Global Foundries, SMIC, iHP, AMS, Vanguard, SilTerra

2 APPLICATION

A bandgap voltage reference is a temperature independent voltage source circuit, widely used as reference in analog and digital circuits. Main applications:

- Voltage regulators
- Comparators
- Detectors
- Measuring systems

3 FUNCTIONAL DESCRIPTION

A bandgap voltage reference produces temperature independent voltage level around 1.16 V using temperature dependencies of bipolar diodes and integrated resistors.

The block is fabricated in TSMC BiCMOS 0.18 μm technology.

4 STRUCTURE

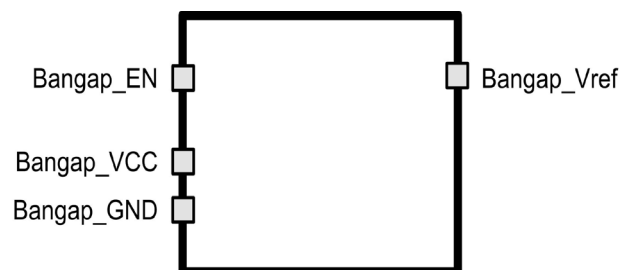


Figure 1: Bandgap voltage reference structure.

5 PIN DESCRIPTION

Name	Direction	Description
Bandgap_EN	I	Enable/disable bangap voltage reference
Bandgap_Vref	O	Output voltage
Bandgap_VCC	IO	Power supply
Bandgap_GND	IO	Ground

6 LAYOUT DESCRIPTION

Bandgap voltage reference circuit dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	130	μm
Width	70	μm

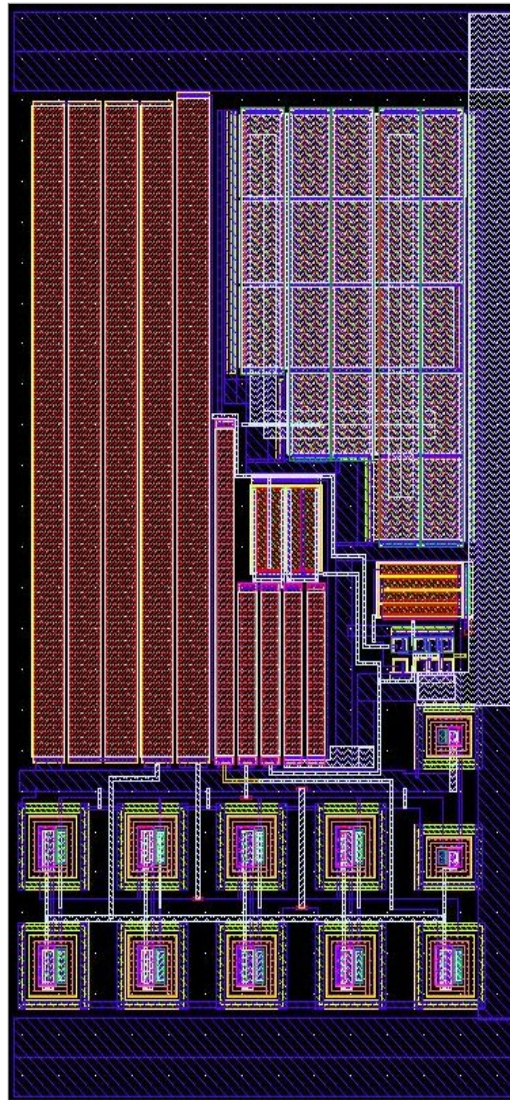


Figure 2: Bandgap voltage reference layout view.

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ TSMC018 SiGe BiCMOS 0.18 μm
 Status _____ silicon proven
 Area _____ 0.009mm²

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc} = 2.8 \div 3.6 \text{ V}$, $T = -40 \div +85^\circ\text{C}$. Typical values are at $V_{cc} = 3.0 \text{ V}$, $T = +27^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ	max	
Supply voltage	V_{cc}	-	2.8	3.0	3.6	V
Output voltage	V_{ref}	-	1.12	1.16	1.2	V
Operating temperature range	T	-	-40	27	85	$^\circ\text{C}$
Output voltage variation in temperature range	dT	-	-	-	0.2	%
Current consumption	I_c	-	-	17	-	μA
Stand-by mode current	I_{sb}	-	-	-	200	nA
Logic high level	V_{IH}	For digital inputs	$0.9V_{cc}$	-	$V_{cc}+0.1$ 5	V
Logic low level	V_{IL}		-0.2	0	0.2	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