

General Description

Creating reference voltages and currents is of major importance in nearly every mixed signal circuit for biasing and comparative purposes. Because of the ambient temperature's impact on most of the circuit's properties, the Bandgap reference makes use of two temperature dependencies having opposite characteristic:

- a pn junction voltage having a temperature coefficient of appr. -2 mV/K
- a multiple of the temperature voltage V_T having a temperature coefficient of appr. +0.085 mV/K

Combination of both allows achieving a zero first order temperature dependency. This analog IP cell generates a reference voltage of 1.15V. Trimming is not required. Additionally, the output voltage is converted to a constant current of 10uA.

The circuit is optimised to give a very low temperature dependency of the output voltage V_{out} .

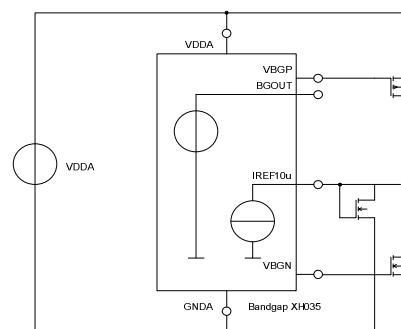
Ratings, Parameters and Conditions, typical conditions

| Parameter / Condition | Symbol | Min | Typ. | Max | Unit | Comment |
|----------------------------------|---------------|------|---------------|--------------|-------------------|---------|
| Electrical Parameters: | | | | | | |
| Supply Voltage | V_{dd} | 3.0 | 3.3 | 3.6 | V | |
| Supply Current | I_{dd} | 22 | 25 | 29 | μ A | |
| Output Voltage | V_{BGOUT} | | 1.15 | | V | |
| Output Current | $I_{IREF10u}$ | 8.5 | 10.4 | 12.5 | μ A | |
| Temp. Coeff. V_{BGOUT} | $TC_{V_{BG}}$ | 17 | | | ppm/ $^{\circ}$ C | |
| Voltage Coeff. V_{BGOUT} | $VC_{V_{BG}}$ | | 0.25 | | mV/V | |
| PSRR V_{BGOUT} | $RR_{V_{BG}}$ | | 75 | | dB | |
| Temp. Coeff. $I_{IREF10u}$ | $TC_{I_{BG}}$ | | | 100 | ppm/ $^{\circ}$ C | |
| Voltage Coeff. $I_{IREF10u}$ | $VC_{I_{BG}}$ | | 104 | | nA/V | |
| PSRR $I_{IREF10u}$ | $RR_{I_{BG}}$ | | 43 | | dB | |
| P Ch. Bias Voltage | V_{PB} | | $V_{dd}-1.12$ | | V | t.b.d |
| N Ch. Bias Voltage | V_{NB} | | 1.07 | | V | t.b.d |
| Absolute Maximum Ratings: | | | | | | |
| Operating Temperature | T_{range} | -20 | | 80 | $^{\circ}$ C | |
| Supply Voltage | V_{dd} | -0.3 | | 5 | V | |
| Input Voltage | V_{in} | -0.3 | | $V_{dd}+0.7$ | | |
| Output Voltage | V_{out} | -0.3 | | $V_{dd}+0.7$ | | |
| Operating Conditions: | | | | | | |
| Ambient Temperature | T_{amb} | -20 | 27 | 80 | $^{\circ}$ C | |

IO-Description

| Interface | I/O | Function | Comment |
|-----------|--------|----------------------------|----------------|
| GNDA | Input | Supply | ground |
| VDDA | Input | Supply | supply voltage |
| VBG | Output | reference voltage | |
| Iref | Output | reference current | |
| VBGN | Output | N channel MOS bias voltage | |
| VBGp | Output | P channel MOS bias voltage | |

Symbol / external schematic



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