

## LDO voltage regulator

### SPECIFICATION

#### 1 FEATURES

- TSMC018 SiGe BiCMOS 0.18  $\mu\text{m}$
- Low drop out
- Low current consumption
- Output voltage digital adjustment
- Portable to other technologies (upon request)

#### 2 APPLICATION

- Supply voltage sensitive circuits

#### 3 OVERVIEW

The voltage regulator consists of a differential amplifier which compares reference voltage with voltage from a feedback divider. It adjusts the impedance of a pass PMOS transistor for stabilization of output voltage at a set level. The output voltage adjustment is defined by the digital code  $OV\langle 1:0 \rangle$ . It is able to change a feedback divider transfer ratio in range of 0.6 / 0.7 / 0.8 / 0.9.

The block is fabricated on TSMC018 SiGe BiCMOS 0.18  $\mu\text{m}$  technology.

#### 4 STRUCTURE

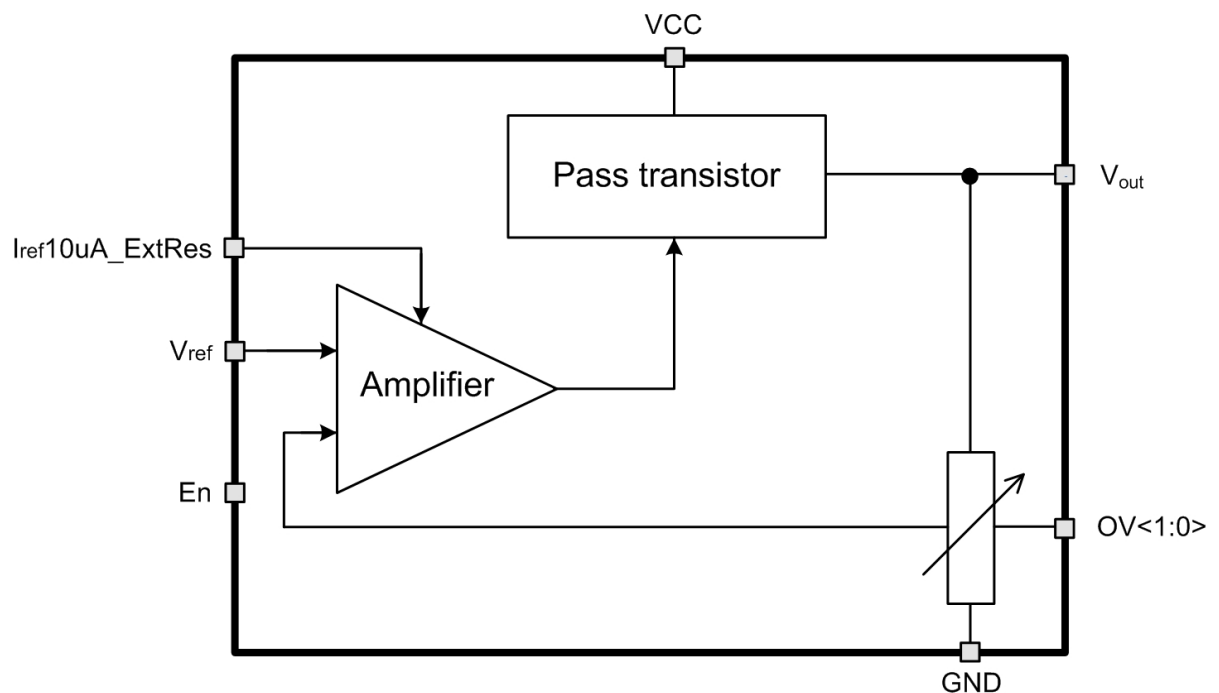


Figure 1: LDO voltage regulator structure

## 5 PIN DESCRIPTION

<b>Name</b>	<b>Direction</b>	<b>Description</b>
$I_{ref10\mu A\_ExtRes}$	I	Reference current 10 $\mu A$
$V_{ref}$	I	Reference voltage
OV<1:0>	I	Digital code of output voltage adjustment
En	I	Enable/disable
$V_{out}$	O	Output voltage
VCC	IO	Supply voltage
GND	IO	Ground

## 6 LAYOUT DESCRIPTION

Programmable LDO voltage regulator dimensions are given in the table 1.

Table 1: Block dimensions

Dimension	Value	Unit
Height	80	$\mu\text{m}$
Width	120	$\mu\text{m}$

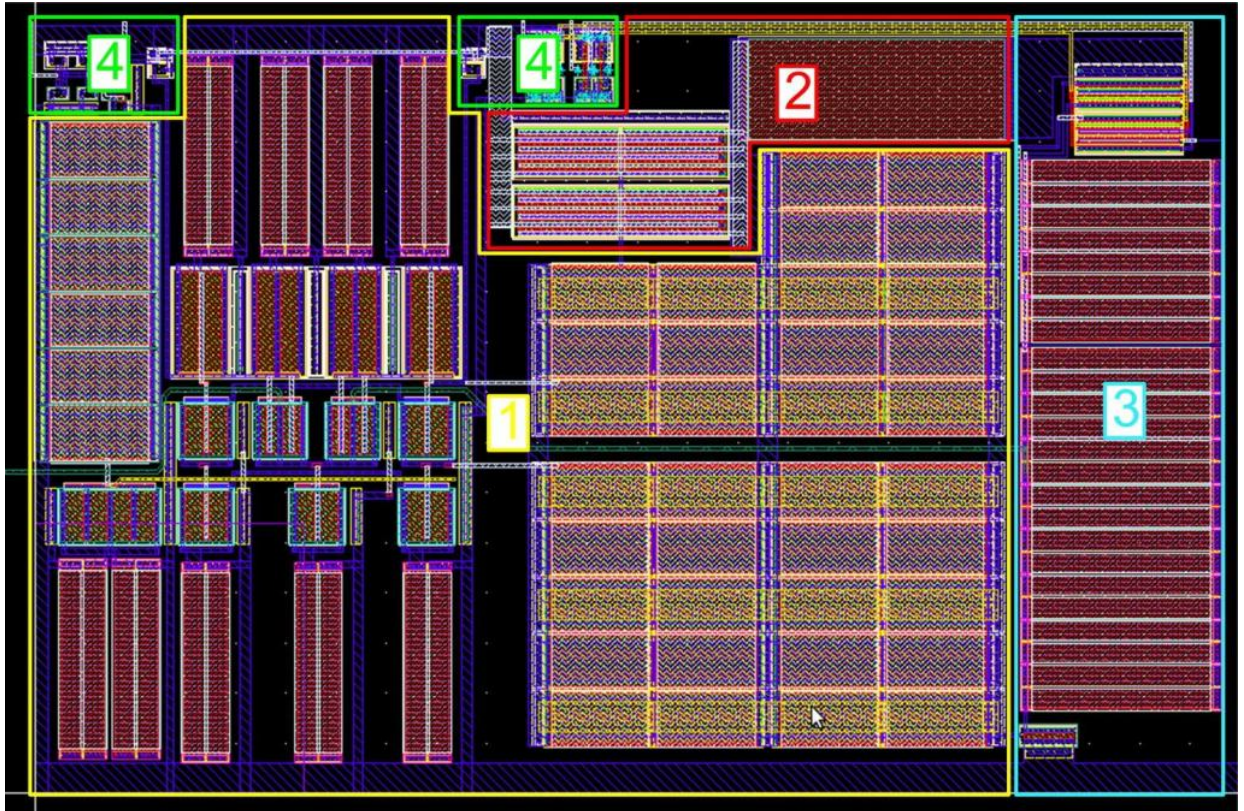


Figure 2: Programmable LDO voltage regulator layout

1. Differential amplifier
2. Pass transistor
3. Feedback divider
4. Control logic

## 7 OPERATING CHARACTERISTICS

### 7.1 TECHNICAL CHARACTERISTICS

Technology \_\_\_\_\_ TSMC018 SiGe BiCMOS  
 Status \_\_\_\_\_ Silicon proven  
 Area \_\_\_\_\_ 0.01 mm<sup>2</sup>

### 7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for  $V_{cc} = 2.4 \div 3.6$  V и  $T = -40 \div +85^{\circ}\text{C}$ . Typical values are at  $V_{cc} = 3.0$  V,  $T = +27^{\circ}\text{C}$ , unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ.	max	
Supply voltage	$V_{cc}$	-	2.4	3.0	3.6	V
Operating temperature range	T	-	-40	+27	+85	°C
Reference voltage	$V_{ref}$	-	0.9	1.16	-	V
Maximum load current	$I_{out}$	-	-	-	2	mA
Output voltage	$V_{out}$	OV<1:0>= "00"	-	$1.6 \times V_{ref}$	-	V
		OV<1:0>= "01"		$1.7 \times V_{ref}$		
		OV<1:0>= "10"		$1.8 \times V_{ref}$		
		OV<1:0>= "11"		$1.9 \times V_{ref}$		
Supply current	$I_{cc}$	-	-	30	-	uA
Stand-by current	$I_{st}$	-	-	1	-	nA
Input logic-level high	$V_{OH}$	For digital inputs	$0.9V_{cc}$	-	$1.1V_{cc}$	V
Input logic-level low	$V_{OL}$		-0.2	-	0.2	V

## 8 DELIVERABLES

Depending on license type IP may include:

- Schematic or NetList
- Abstract view (.lef and .lib files)
- Layout (optional)
- Verilog behavior model
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation