

## Features

- Frequency Range 2.4 GHz to 2.5 GHz
- Linear  $P_{out}$  18 dBm Typically
- Gain 20 dB Typically
- $V_{CC}$  from 2.7 V to 3.6 V
- Package: HP-VFQFP-N16 ( $4 \times 4 \text{ mm}^2$ )

## Benefits

- High Efficiency and Biasing Control Extends Battery Life Time
- Reduction of Current Consumption by Power-down Mode
- No External Components for Input Matching
- Space Saving  $4 \times 4 \text{ mm}^2$  Package

Electrostatic sensitive device.  
Observe precautions for handling.



## Description

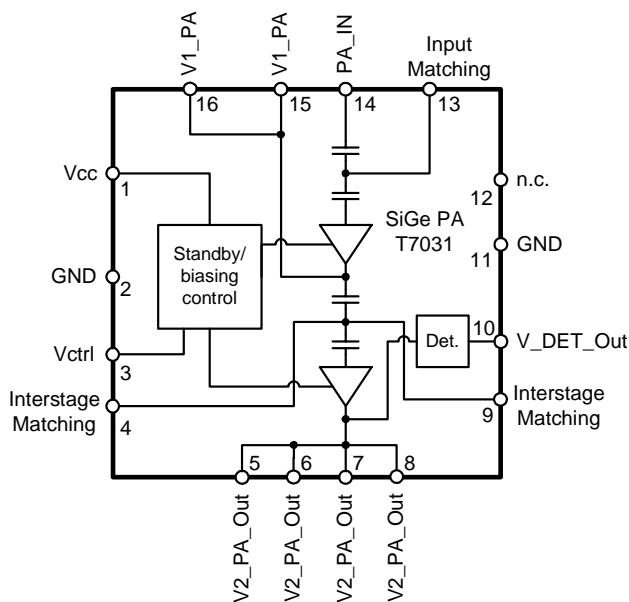
### Process

The 2.4-GHz power amplifier is designed in Atmel's Silicon-Germanium (SiGe) process and provides excellent noise performance, high gain as well as good power-added efficiency.

### Circuitry

The 802.11b/802.11g PA consists of a two-stage amplifier with a linear output power of 18 dBm. The output stages were realized using an open-collector structure. The IC features  $50\text{-}\Omega$  input matching. Power-up/down and biasing are controlled at the Pin Vcontr. An integrated power detector provides a voltage proportional to the output power.

Figure 1. Block Diagram



## 2.4-GHz SiGe Power Amplifier for 802.11b and 802.11g WLAN Systems

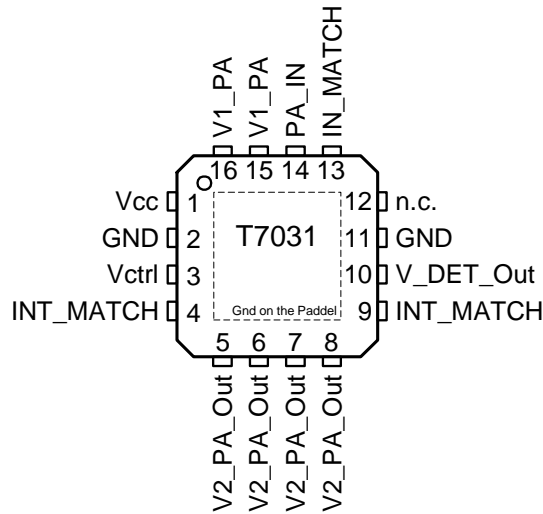
### T7031

### Preliminary



## Pin Configuration

Figure 2. Pinning HP-VFQFP-N16



## Pin Description

Pin	Symbol	Function
1	Vcc	Supply voltage
2	GND	Ground
2	Vctrl	Power-up/biasing control voltage
4	INT_MATCH	Interstage matching
5	V2_PA_Out	Power amplifier output and supply voltage for 2nd power amplifier stage
6	V2_PA_Out	Power amplifier output and supply voltage for 2nd power amplifier stage
7	V2_PA_Out	Power amplifier output and supply voltage for 2nd power amplifier stage
8	V2_PA_Out	Power amplifier output and supply voltage for 2nd power amplifier stage
9	INT_MATCH	Interstage matching
10	V_DET_Out	Power detector output
11	GND	Ground
12	n.c.	Not connected
13	IN_MATCH	Input matching
14	PA_IN	Power amplifier input
15	V1_PA	Supply voltage for 1 <sup>st</sup> power amplifier stage
16	V1_PA	Supply voltage for 1 <sup>st</sup> power amplifier stage
Slug	–	Ground

## Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage	$V_{CC}$	6	V
Supply current	$I_{CC}$	200	mA
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{Stg}$	-40 to +125	°C
Input RF power	$P_{in}$	12	dBm
Control voltage power up/down and biasing	$V_{contr}$	0 to 3	V

## Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	$R_{thJA}$	35	K/W

## Operating Range

Parameters	Symbol	Value	Unit
Supply voltage range	$V_{CC}$	2.7 to 3.6	V
Ambient temperature range	$T_{amb}$	-30 to +80	°C

## Electrical Characteristics

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
	Supply voltage			$V_{CC}$	2.7	3.3	3.6	V	
	Frequency Range			f	2400		2500	MHz	
	P1dB output Power			P1dB		23		dBm	
	Saturated output power	For reference		$P_{sat}$		24		dBm	
	Linear power gain			GI		20		dB	
	Current Consumption	$P_{out} = 18$ dBm		$I_{CC}$		90		mA	
		Power-down mode		$I_{pd}$			15	µA	
	Power added efficiency	$P_{out} = 18$ dBm		PAE		20		%	
	Adjacent channel power rejection	$P_{out} = 18$ dBm <sup>(2)</sup> First side lobe Second side lobe		ACPR1		-33		dBc	
				ACPR2		-55		dBc	
	2nd harmonic	P1dB		2f <sub>out</sub>		-30		dBc	
	Input 50 Ω VSWR			VSWR <sub>in</sub>			2:1		
	Output 50 Ω VSWR	With external matching		VSWR <sub>out</sub>			2:1		
	Reverse isolation	On and off mode		ISO <sub>r</sub>		35		dB	

\*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

- Notes: 1. The current of the PA can be controlled by the Pin V<sub>contr</sub>. For lower output level demand, the current can be reduced.  
2. With IEEE 802.11b conform modulation.

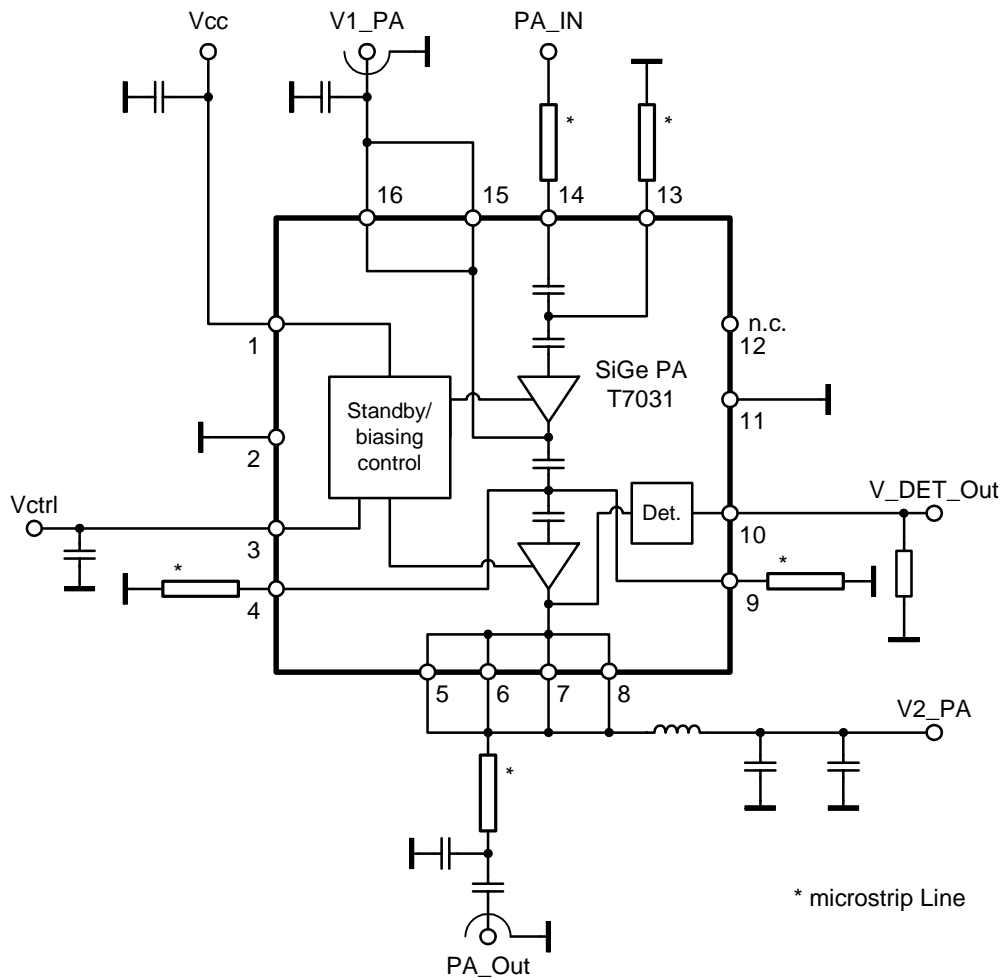
## Electrical Characteristics (Continued)

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
	Control voltage range	PA operating mode (Biasing) <sup>(1)</sup>		Vcontr	1		2	V	
		Power down		Vcontr			0.2	V	
<b>Power Detector</b>									
	Maximum power			PDETmax		22		dBm	
	Minimum power			PDETmin		2		dBm	
	Settling time			tset		0.5		μs	
	Maximum voltage			VDETmax		2		V	

\*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

- Notes: 1. The current of the PA can be controlled by the Pin Vcontr. For lower output level demand, the current can be reduced.  
2. With IEEE 802.11b conform modulation.

**Figure 3.** Application Circuit



### Ordering Information

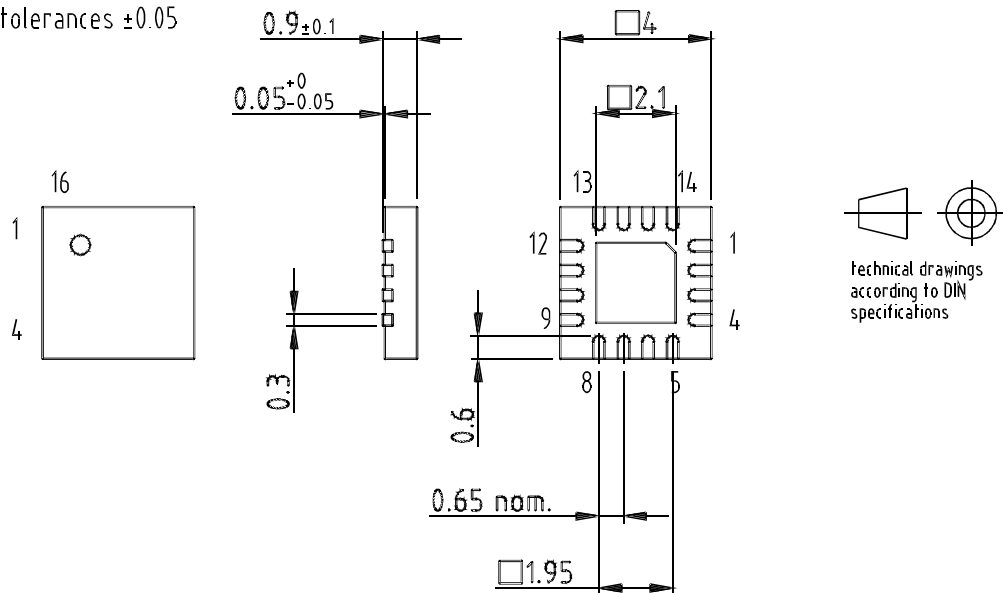
Extended Type Number	Package	Remarks	MOQ
T7031M-PEP	HP-VFQFP-N16	Taped and reeled	1500
T7031M-PEQ	HP-VFQFP-N16	Taped and reeled	6000

### Package Information

Package: HP-VFQFP-N16  
 (acc. JEDEC OUTLINE No. MO-220)

Dimensions in mm

Not indicated tolerances  $\pm 0.05$



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