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 (4×4 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 4×4 mm^2 Package**

Electrostatic sensitive device.
Observe precautions for handling.

Description

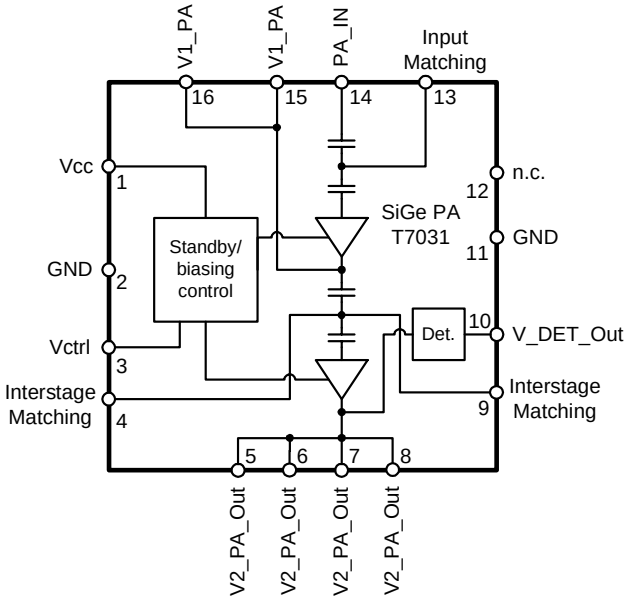
Process

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-Ω 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

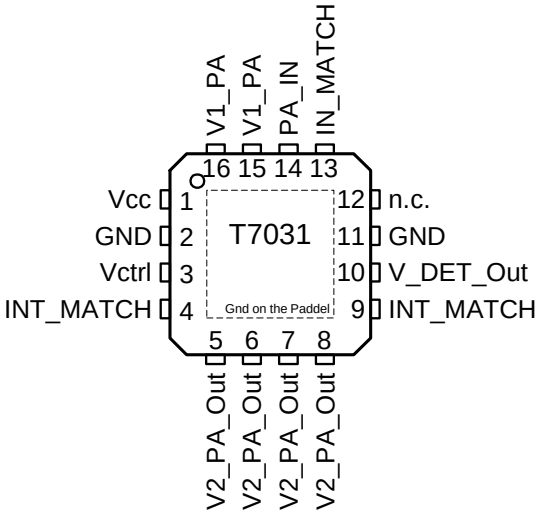
T7031

Preliminary

Rev. 4564B–WLAN–02/03

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 1st power amplifier stage
16	V1_PA	Supply voltage for 1st 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	Pin	12	dBm
Control voltage power up/down and biasing	Vcontr	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		Psat		24		dBm	
	Linear power gain			Gl		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 (2) First side lobe Second side lobe		 ACPR1 ACPR2		 -33 -55		 dBc dBc	
	2nd harmonic	P1dB		2fout		-30		dBc	
	Input 50 Ω VSWR			VSWRin			2:1		
	Output 50 Ω VSWR	With external matching		VSWRout			2:1		
	Reverse isolation	On and off mode		ISOr		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 Vcontr. For lower output level demand, the current can be reduced.
2. With IEEE 802.11b conform modulation.

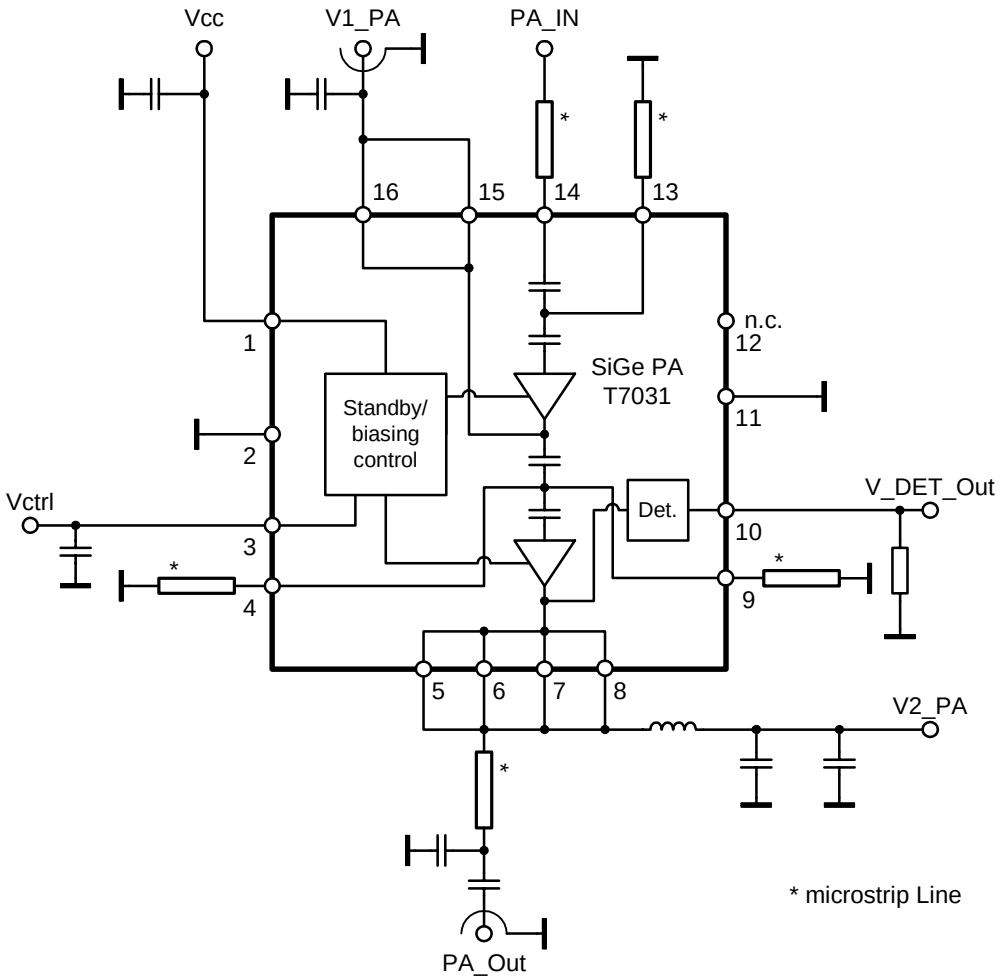
Electrical Characteristics (Continued)

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
	Control voltage range	PA operating mode (Biasing) (1)		Vcontr	1		2	V	
		Power down		Vcontr			0.2	V	
Power Detector									
	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

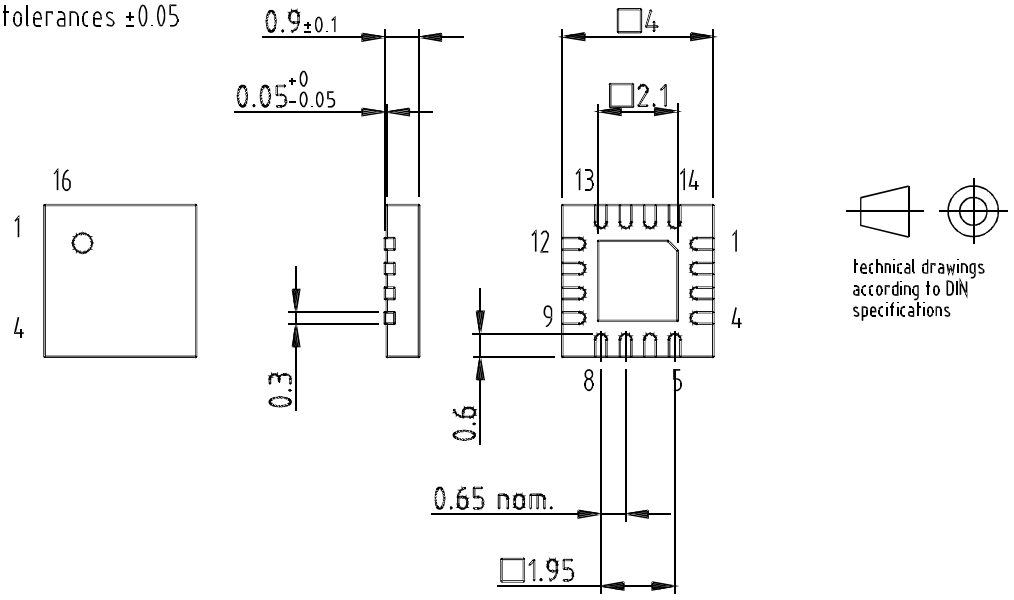


Ordering Information

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 ±0.05



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