Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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Features

- **Single 3-V supply voltage**
- **High-power-added efficient power amplifier (P_{out} typ. 23 dBm)**
- **Ramp-controlled output power**
- **Current-saving standby mode**
- **Few external components**
- **HP-VFQFP-N16**

Electrostatic sensitive device.
Observe precautions for handling.

ISM/Bluetooth™ 2.4-GHz Power Amplifier

T7023

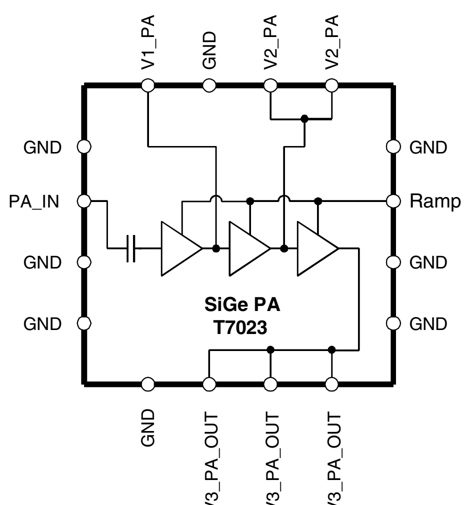
Description

The T7023 is a monolithic SiGe power amplifier. It is especially designed for operation in TDMA systems like Bluetooth, DECT, IEE 802.11 FHSS WLAN, home RF and ISM proprietary radios.

Due to the ramp-control feature and a very low quiescent current, an external switch transistor for V_S is not required.

Block Diagram

Figure 1.



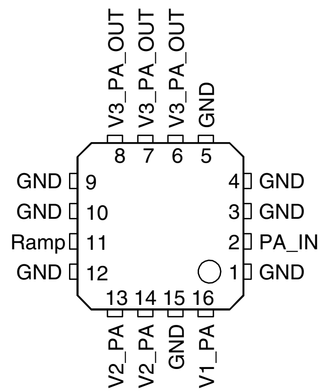
Ordering Information

Extended Type Number	Package	Remarks
T7023-PES	HP-VFQFP-N16	Tube
T7023-PEQ	HP-VFQFP-N16	Taped and reeled
T7023-DB	Flipchip	

Rev. A4, 06-Dec-01

Pin Configuration

Figure 2. Pinning HP-VFQFP-N16



Pin Description

Pin	Symbol	Function
1	GND	Ground
2	PA_IN	Power amplifier input
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	V3_PA_OUT	Inductor to power supply and matching network for power amplifier output
7	V3_PA_OUT	Inductor to power supply and matching network for power amplifier output
8	V3_PA_OUT	Inductor to power supply and matching network for power amplifier output
9	GND	Ground
10	GND	Ground
11	RAMP	Power ramping control input
12	GND	Ground
13	V2_PA	Inductor to power supply for power amplifier
14	V2_PA	Inductor to power supply for power amplifier
15	GND	Ground
16	V1_PA	Supply voltage for power amplifier
Slug	GND	Ground

Absolute Maximum Ratings

All voltages are referred to ground (Pins GND and slug), no RF

Parameter	Symbol	Value	Unit
Supply voltage Pins V1_PA, V2_PA and V3_PA_OUT	V_S	6	V
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-40 to +125	°C
RF input power PA	P_{inPA}	10 dBm	dBm

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction ambient HP-VFQFP-N16	R_{thJA}	t.b.d.	K/W

Operating Range

All voltages are referred to ground (Pins GND and slug). Power supply points are V1_PA, V2_PA, V3_PA_OUT.
The following table represents the sum of all supply currents depending on the TX mode.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage Pins V1_PA, V2_PA and V3_PA_OUT	V_S	2.7	3.0	4.6	V
Supply current	I_S		165		mA
Standby current	I_S		10		µA
Ambient temperature	T_{amb}	-25	+25	+70	°C

Electrical Characteristics

Test conditions (unless otherwise specified): V_S = 3.0 V, T_{amb} = 25°C

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
Power Amplifier [1])									
	Supply voltage	Pins V1_PA, V2_PA and V3_PA_OUT		V_S	2.7	3.0	4.6	V	
	Supply current	TX		I_{S_TX}		165		mA	
		RX (PA off), $V_{RAMP} \geq 0.1$ V		I_{S_RX}			10	µA	
		Standby		$I_{S\_standby}$			10	µA	
	Frequency range	TX		f	2.4		2.5	GHz	
	Gain-control range	TX		ΔGp	60	42		dB	
	Power gain max.	TX Pin PA_IN to V3_PA_OUT		Gp	28	30	33	dB	
	Power gain min.	TX Pin PA_IN to V3_PA_OUT		Gp	-40		-17	dB	
	Ramping voltage max.	TX, power gain (max) Pin RAMP		$V_{RAMP\ max}$	1.7	1.75	1.83	V	
	Ramping voltage min.	TX, power gain (min) Pin RAMP		$V_{RAMP\ min}$		0.1		V	
	Ramping current max.	V = 1.75 V					0.5	mA	
	Power-added efficiency	TX		PAE	35	40		%	
	Saturated output power	TX, input power = 0 dBm referred to Pins V3_PA_OUT		P_{sat}	22.5	23	23.5	dBm	
	Input matching [2)]	TX, Pin PA_IN		Load VSWR		<1.5:1	1.5 : 1		
	Output matching [2)]	TX, Pin V3_PA_OUT		Load VSWR		<1.5:1	1.5 : 1		
	Harmonics @P 1dBCP	TX, Pin V3_PA_OUT		2 fo			-30	dBc	
	Harmonics @P 1dBCP	TX, Pin V3_PA_OUT		3 fo			-30	dBc	

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

Notes: 1) Power amplifier shall be unconditional stable, maximum duty cycle 100%, true cw operation, maximum load mismatch and duration t.b.d.

2) With external matching network, load impedance 50 Ω

Typical Operating Characteristics

Figure 3. Output power and PAE vs. supply voltage

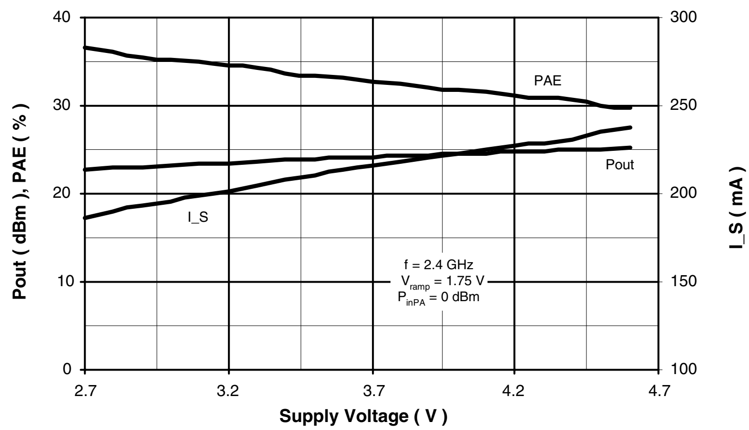


Figure 4. Output power and PAE vs. frequency

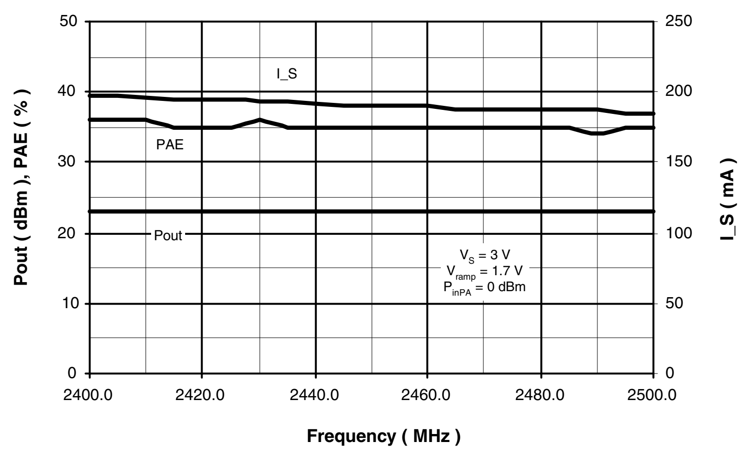


Figure 5. Output power and PAE vs. ramp voltage

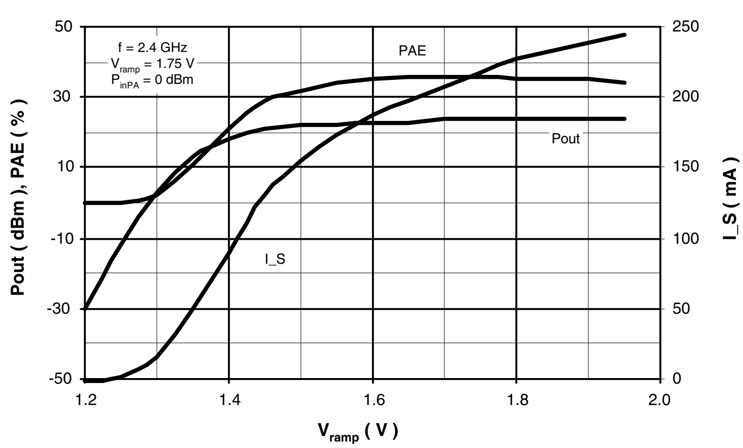


Figure 6. Output power and PAE vs. input power

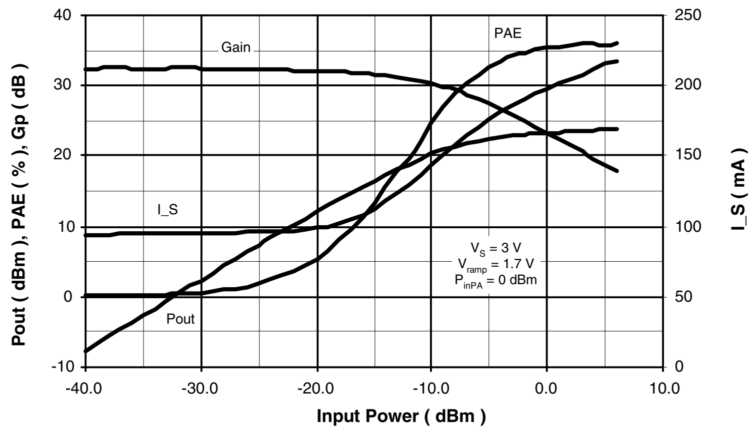


Figure 7. P_{out} vs. V_{ramp} and temperature

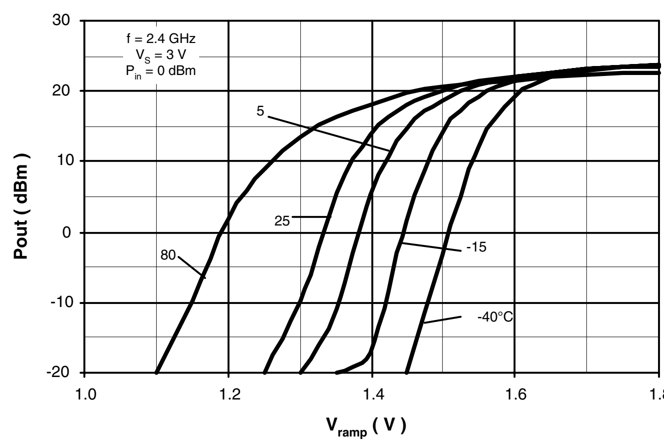


Figure 8.

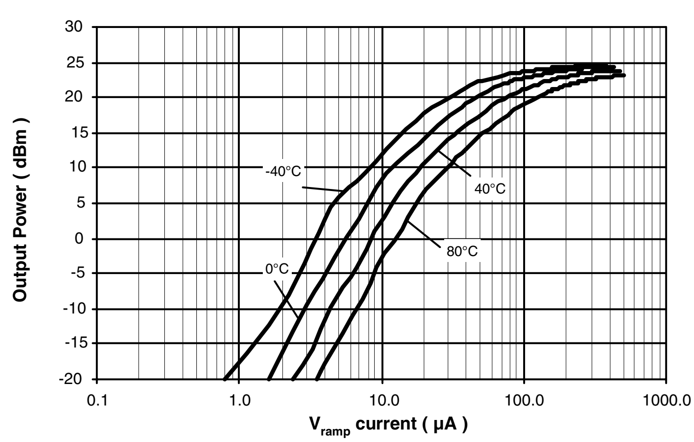
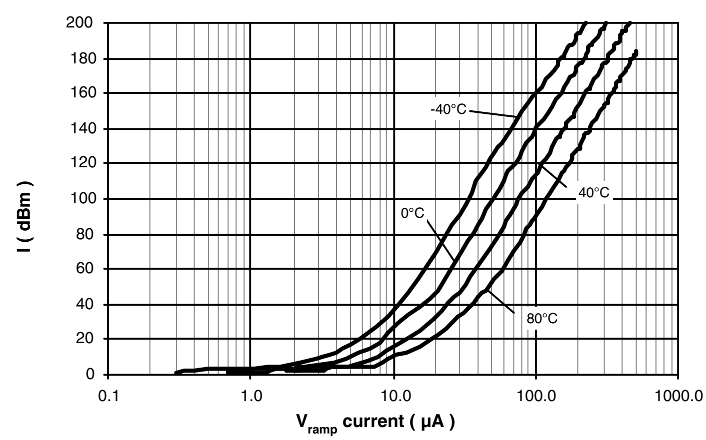


Figure 9.



Input / Output Circuits

Figure 10.

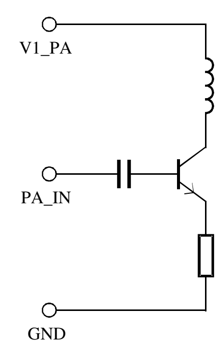


Figure 11.

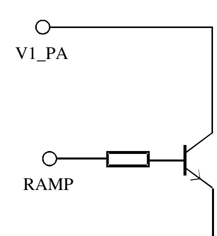


Figure 12.

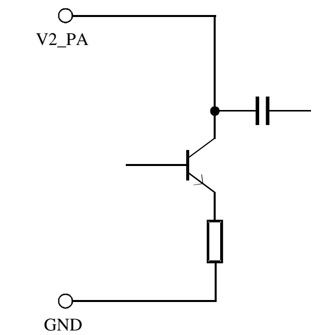
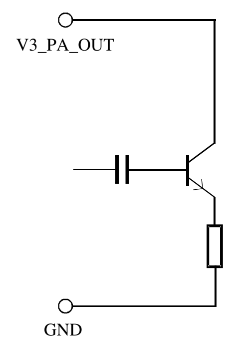
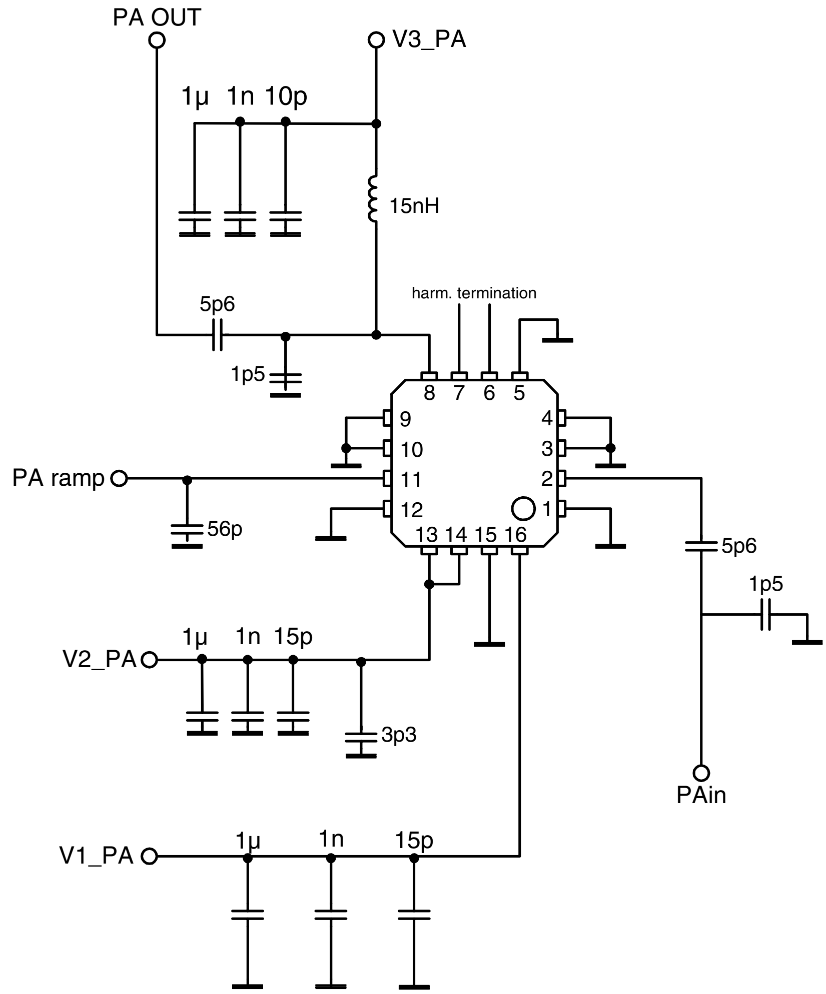


Figure 13.



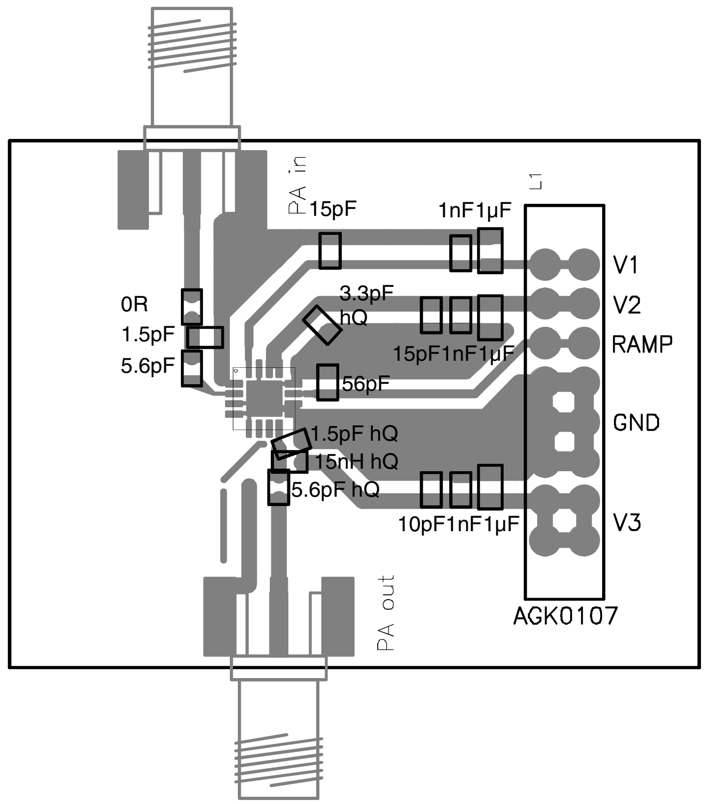
Application Board Schematic

Figure 14.

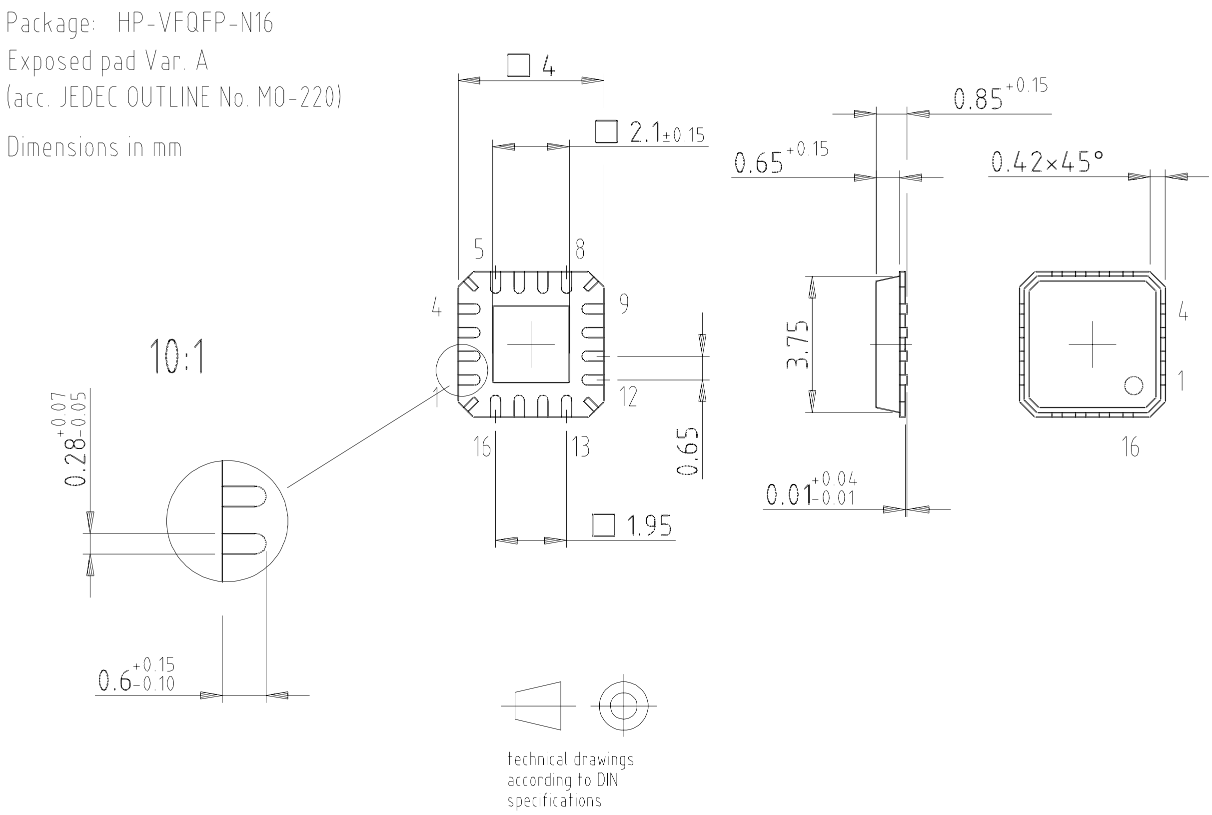


Application Board Layout

Figure 15.



Packaging Information



Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany GmbH** to

1. Meet all present and future national and international statutory requirements.

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Atmel Germany GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Atmel Germany GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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