Features

- **High-power-added Efficient Power Amplifier (P_{out} Typically 29 dBm)**
- **Controlled Output Power**
- **Low-noise Preamplifier (NF Typically 1.5 dB)**
- **Few External Components**
- **PSSO20 Plastic Package with Down-set Paddle**

Electrostatic sensitive device.
Observe precautions for handling.

UHF SiGe Front-end IC

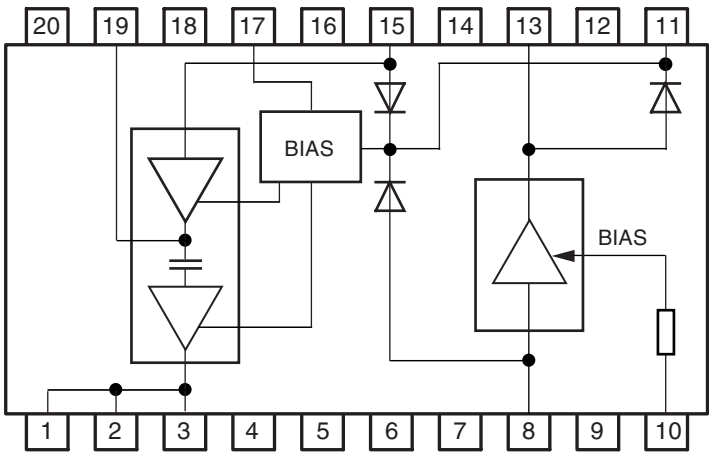
ATR0981

Preliminary

1. Description

The ATR0981 is a monolithic IC manufactured using Atmel's advanced SiGe technology. The IC performs a transmit and receive front-end function, dedicated for a frequency range of 300 MHz to 500 MHz. It consists of a Low-Noise Amplifier (LNA) and a Power Amplifier (PA) with good Power-added Efficiency (PAE).

Figure 1-1. Block Diagram



Rev. 4862A–SIGE–09/05

2. Pin Configuration

Figure 2-1. Pinning PSSO20 with Down Set Paddle

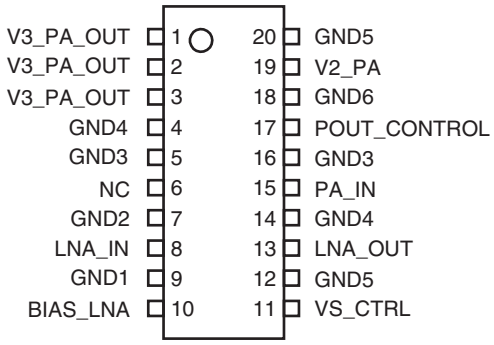


Table 2-1. Pin Description

Pin	Symbol	Function
1	V3_PA_OUT	Matching network for power amplifier output
2	V3_PA_OUT	Inductor to power supply and matching network for power amplifier output
3	V3_PA_OUT	Inductor to power supply and matching network for power amplifier output
4	GND4	Ground
5	GND3	Ground
6	NC	Not connected
7	GND2	Ground
8	LNA_IN	Low-noise amplifier input
9	GND1	Ground
10	BIAS_LNA	Resistor to V_S sets the LNA current
11	VS_CTRL	Supply voltage for control of power amplifier
12	GND5	Ground
13	LNA_OUT	Low-noise amplifier output and supply voltage
14	GND4	Ground
15	PA_IN	Power amplifier input
16	GND3	Ground
17	POUT_CONTROL	Power amplifier control input
18	GND6	Ground
19	V2_PA	Supply voltage for power amplifier
20	GND5	Ground

3. Absolute Maximum Ratings

All voltages are referred to GND (Pins 7, 9, 16, 18, 20, Slug)

Parameters	Symbol	Min.	Max.	Unit
Supply voltage PA, TX, pins 1, 2, 3, 11, 19	V_S_PA		5	V
Supply voltage LNA, RX, pin 13	V_S_LNA		2.8	V
PA control voltage, TX, pin 17	V_{CNTL}		5	V
Junction temperature	T_{jmax}		150	°C
Storage temperature	T_{Stg}	–55	+125	°C
Electrostatic handling HMB, all RF pins	V_{ESD}		200	V
Electrostatic handling HMB, all control pins	V_{ESD}		2	kV

4. Operating Range

All voltages are referred to GND (Pins 7, 9, 16, 18, 20, Slug). The following table represents the sum of all supply currents into the mentioned pins.

Parameters	Test Conditions/Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage PA	TX, pins 1, 2, 3, 11, 19	V_S_PA	3.0	3.6	4.5	V
Supply voltage LNA	RX, pin 13	V_S_LNA	2.4	2.5	2.6	V
Supply current PA	TX, pins 1, 2, 3, 11, 19	I_S_PA		400		mA
Supply current LNA	Pins 10, 13	I_S_LNA		2.5		mA
Ambient temperature		T_{amb}	–30	+25	+60	°C

5. Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	R_{thJA}	19	K/W

6. Electrical Characteristics

Test conditions (unless otherwise specified) : V_S_PA = 3.6V, T_{amb} = 25° C.

Parameters	Test Conditions/Pins	Symbol	Min.	Typ.	Max.	Unit
Power Amplifier(1)						
Supply voltage	TX, pins 1, 2, 3, 11, 19	V_S_PA	3.0	3.6	4.5	V
Supply current	TX, pins 1, 2, 3, 11, 19	I_S_PA		400	550	mA
Frequency range	TX	f	300		500	MHz
Power gain	TX, pin 15 to pins 1, 2, 3	Gp	30	34		dB
Output power control range	TX	ΔPout	±1		±3	dB
Control voltage	TX, output power (maximum), pin 17			2.0	2.5	V
	TX, output power (minimum), pin 17			0.7		V
Control current	Pin 17		0		400	µA
Shut down mode	Control voltage ≤0.1V, pins 1, 2, 3, 11, 19	I_S_PA		10	20	µA
Power added efficiency	TX at 466 MHz	PAE	50	55		%
Saturated output power	TX, input power 3 dBm	Psat	27.5	29	30.5	dBm
Harmonics	TX, input power 3 dBm	2 fo		–20		dBc
	TX, input power 3 dBm	3 fo		–20		dBc
Low-noise Amplifier						
Supply voltage	RX, pins 10, 13	V_S_LNA	2.4	2.5	2.6	V
Supply current	RX, pins 10, 13	I_S_LNA		2.5	3.5	mA
Frequency range	RX	f	300		500	MHz
Power gain	RX at R1 = 5.6 kΩ, I_S = 2.5 mA	Gp	17.5	19	20.5	dB
Noise figure(2)	RX at R1 = 5.6 kΩ, I_S = 2.5 mA	NF		1.5	2.0	dB
Isolation	RX at R1 = 5.6 kΩ, I_S = 2.5 mA	ISO		20		dB
Third-order input interception point	RX at R1 = 5.6 kΩ, I_S = 2.5 mA	IIP3	–13	–10		dBm

Notes: 1. Power amplifier should be unconditionally stable, maximum duty cycle 100%, true cw operation, maximum load mismatch 10:1 for 5s at 3.6V

2. Ensured by design

7. Typical Characteristics

Figure 7-1. Power Sweep

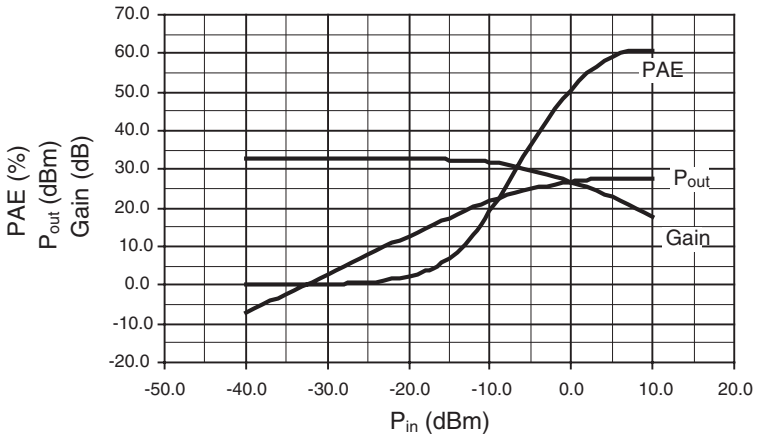


Figure 7-2. Ramp Sweep

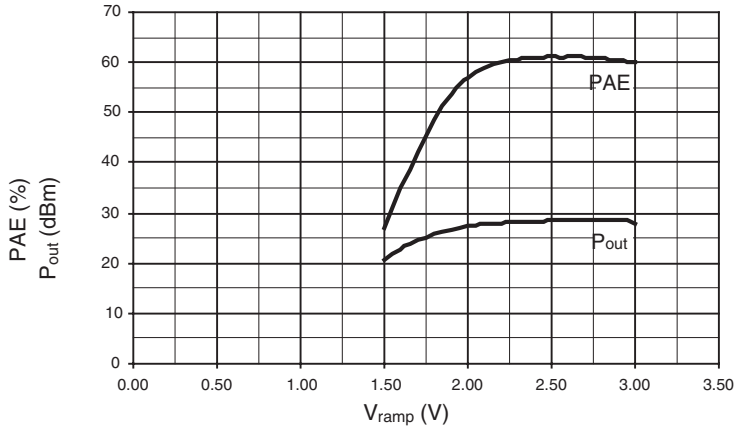
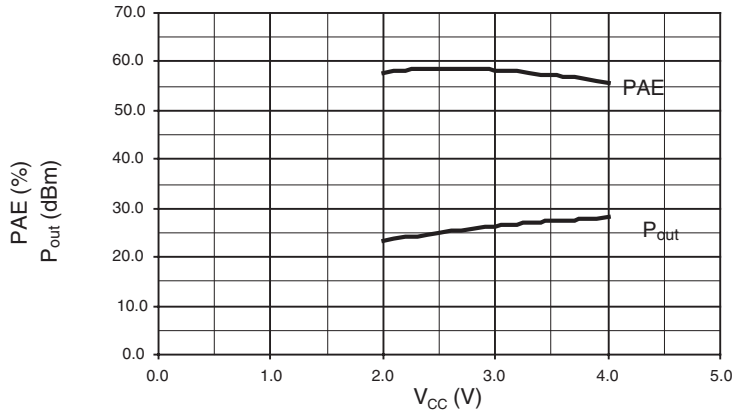


Figure 7-3. V_{CC} Sweep



8. Application Circuit

Figure 8-1. Typical Application Circuit

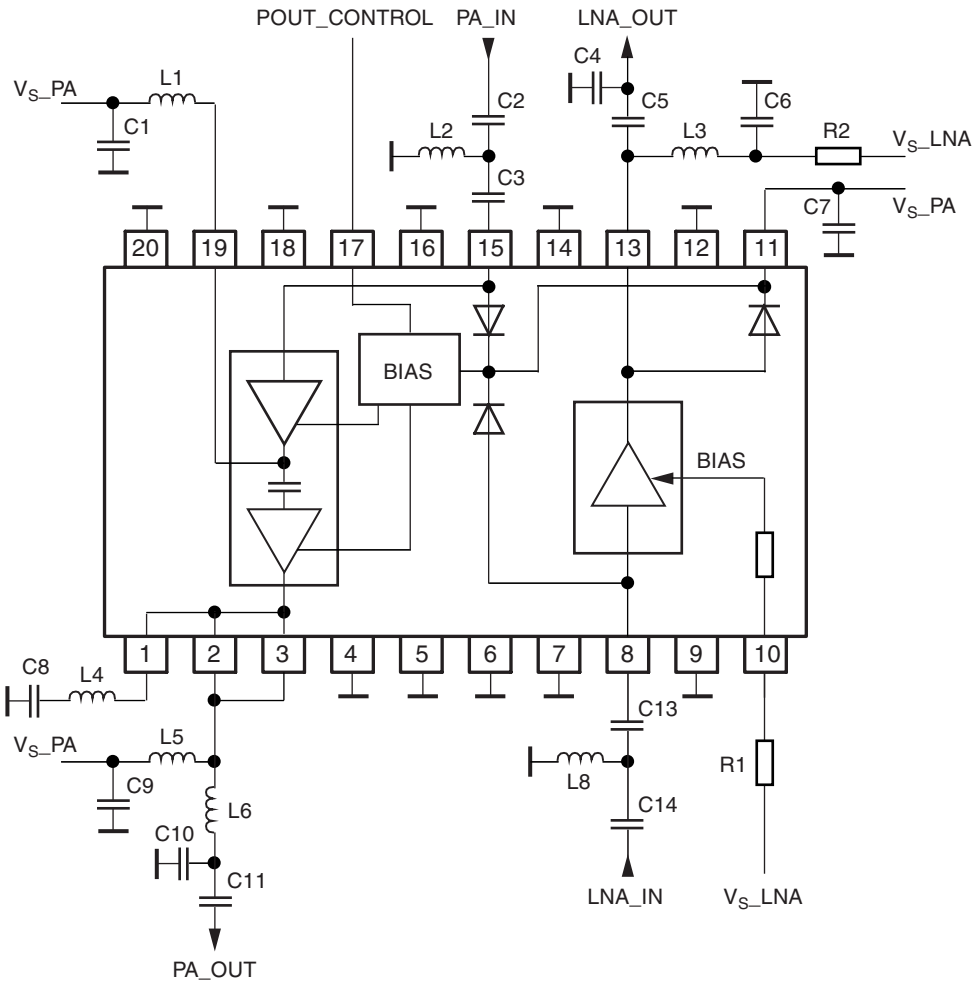


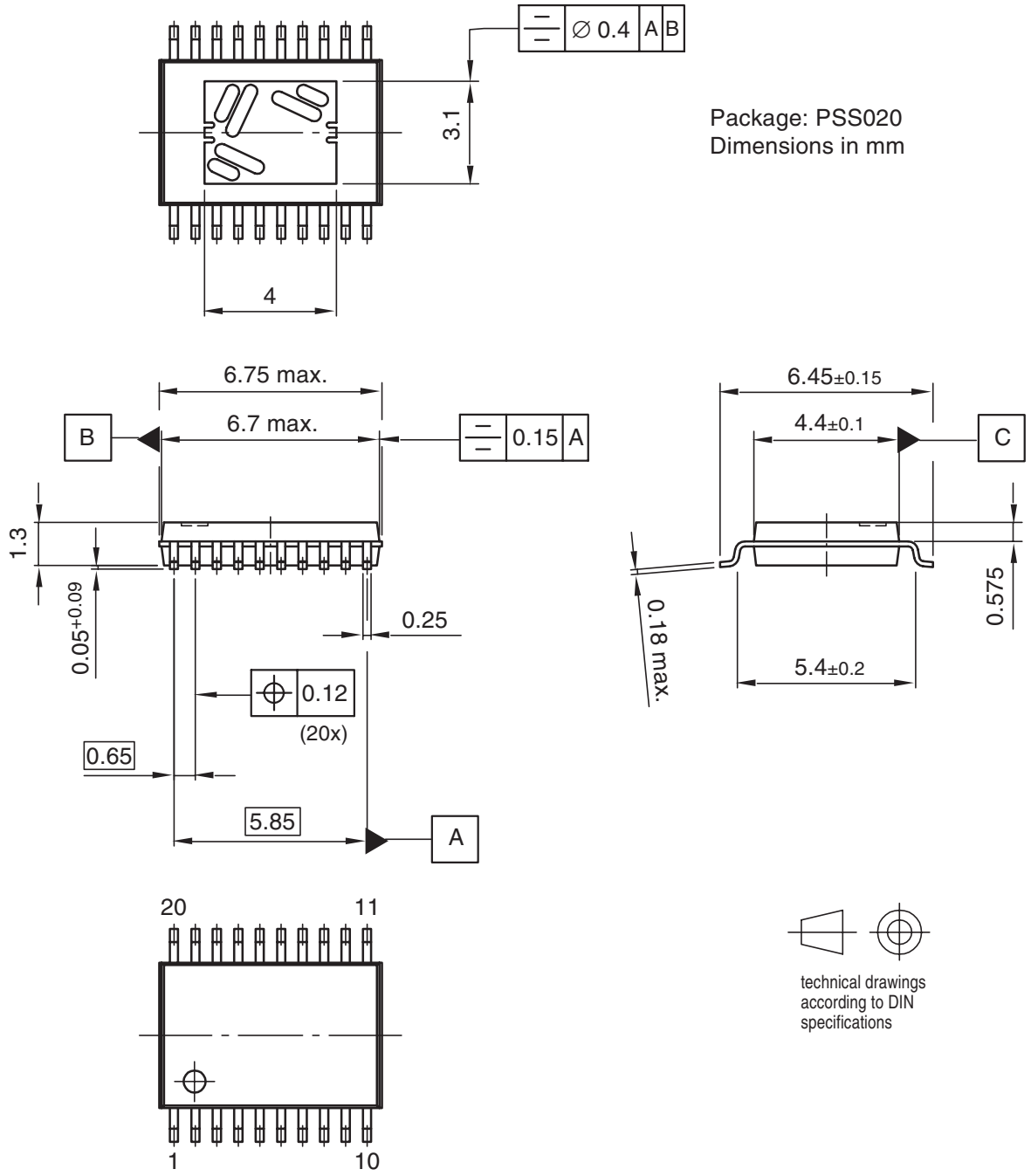
Table 8-1. Bill of Materials for 460 MHz Applications

Part No.	Description	Part Value	Package	Vendor
C1	Capacitor	1 nF	0603	Standard
C2, C3, C7, C9, C11, C13	Capacitor	100 pf	0603	Standard
C4	Capacitor	n.c.	0603	Standard
C5	Capacitor	3.9 pF	0603	Standard
C6	Capacitor	220 pF	0603	Standard
C8	Capacitor	2.7 pF	0604	Standard
C10	Capacitor	12 pF	0603	Standard
C14	Capacitor	8.2 pF	0603	Standard
L1	Inductor	1.5 nH	0805	Standard
L2	Inductor	39 nH	0805	Standard
L3, L5, L8	Inductor	22 nH	0805	Standard
L4	Inductor	6.8 nH	0805	Standard
L6	Inductor	3.9 nH	0805	Standard
R2	Resistor	0	0603	Standard

9. Ordering Information

Extended Type Number	Package	Remarks
ATR0981-TRUY	PSSO20	Tube
ATR0981-TRHY	PSSO20	Taped and reeled

10. Package Information



Package: PSS020
Dimensions in mm

Drawing-No.: 6.543-5071.01-4
Issue: 1; 23.08.00

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