RF106
900 MHz ISM Band Power Amplifier

Data Sheet

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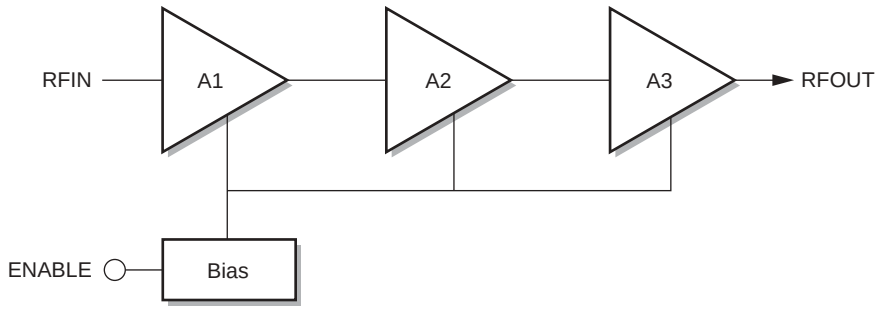
RF106

900 MHz ISM Band Power Amplifier

The RF106 is a three-stage class AB-type RF power amplifier for 900 MHz Industrial, Scientific, and Medical (ISM) band applications. It delivers output power proportional to the input signal power, making it ideal for applications with smooth linearity requirements.

Functional Block Diagram



Distinguishing Features

- Class AB-type RF power amplifier
- 100 mW peak envelope output power
- Very fast settling from standby mode to active mode
- Efficient high output power operation
- Very few external components required
- Extremely low power sleep mode
- 20-pin TSSOP package

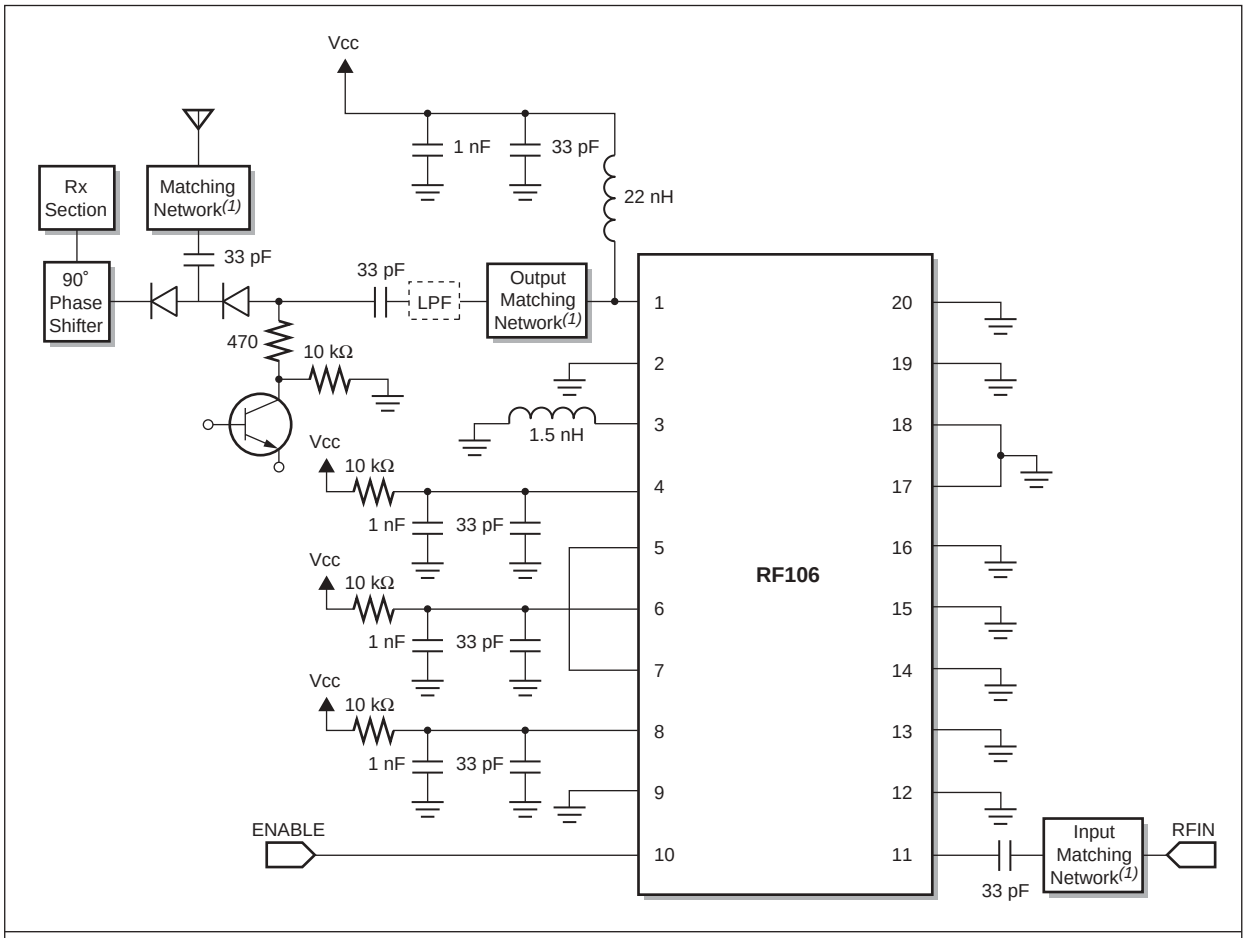
Applications

- Direct sequence spread spectrum systems
- Frequency hopping spread spectrum systems
- Wireless modems
- Wireless security
- Inventory control systems
- Remote monitoring
- Cordless telephones

Technical Description

The RF106 is a three-stage, class AB-type RF power amplifier for the 902–928 MHz ISM band. A class AB power amplifier allows a wide range of output powers without excessive idle power dissipation. Figure 1 shows a typical application circuit for the RF106.

Figure 1. RF106 Typical Application Circuit



FOOTNOTE:

(1) Matching network values are layout-dependent.

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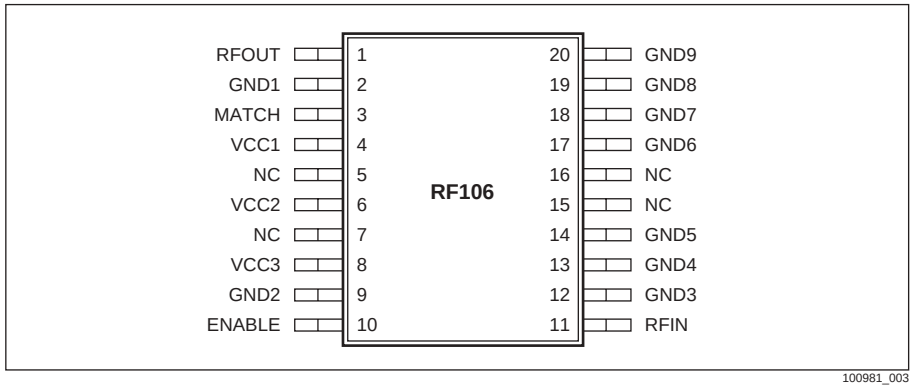
The RF106 is operational in the 900 MHz ISM band with supply voltage ranging from 2.7V to 5V. It is available in a small 20-pin TSSOP package, shown in Figure 2.

Figure 2. RF106 Pin Signals — 20-Pin TSSOP



Recommendations on Layout and Implementation

Matching

An input matching network and an output matching network are needed for maximum power transfer. For greatest efficiency, it is recommended that the input matching network be determined before the output matching network. Matching network values are layout-sensitive. If the RF106 is used with Conexant's RF105 transceiver, the input matching network is not required if the connecting traces are short.

Bypassing

All Vcc pins should have proper bypassing. These decoupling capacitors should be placed very close to the pins, preferably right at the Vcc pins.

A bypassing capacitor of 33pF and a decoupling capacitor of 1nF for low frequency noise are recommended. Due to layout variations, the value of the capacitor may vary.

General Grounding Requirements

All ground pins should have minimum trace inductance to ground. If a ground plane cannot be provided right at the pins, the vias to ground plane should be placed as close to the pins as possible. There should be one via for each ground pin, unless otherwise specified. If the ground plane is at the bottom layer, two vias per pin in parallel may be required.

It is important to provide pins 13 and 14 with separate low-impedance connections to GND, isolated from other top-layer grounds.

NC pins are not used and should be connected to ac ground, Vcc or ground, as shown in Figure 1.

ESD Sensitivity

The RF106 is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. Take proper Electrostatic Discharge (ESD) precautions.

Interface Description

Table 1 describes the pin signals for the RF106.

Table 1. Pin Signal Descriptions

Pin No.	Name	Description
1	RFOUT	Power amplifier output Connect to power supply through an inductor; matching network required before connecting to antenna.
2	GND1	Ground
3	MATCH	Interstage matching Connect to ground through a 1.5 nH (typical) inductor.
4	VCC1	Power supply
5	NC	Not used Connect to ac ground, Vcc or ground (Figure 1).
6	VCC2	Power supply Internally connected to middle stage matching network.
7	NC	Not used Connect to ac ground, Vcc or ground (Figure 1).
8	VCC3	Power supply
9	GND2	Ground
10	ENABLE	Chip enable (active high)
11	RFIN	Power amplifier input
12	GND3	Ground
13	GND4	Ground
14	GND5	Ground
15	NC	Not used Connect to ac ground, Vcc or ground (Figure 1).
16	NC	Not used Connect to ac ground, Vcc or ground (Figure 1).
17	GND6	Ground
18	GND7	Ground
19	GND8	Ground
20	GND9	Ground

Specifications

Table 2 lists the absolute maximum ratings for the RF106. Table 3 lists the electrical specifications for the RF106.

Table 2. Absolute Maximum Ratings

Parameter	Minimum	Maximum	Unit
Supply voltage (Vcc)(1)		+5	V
Input voltage range(1)	GND	VCC	V
Power dissipation at high output power mode		400	mW
Ambient operating temperature (T_A)	–10	+70	°C
Storage temperature	–40	+125	°C

FOOTNOTE:
(1) Voltages are referenced to GND.

Table 3. RF106 Electrical Specifications(1)

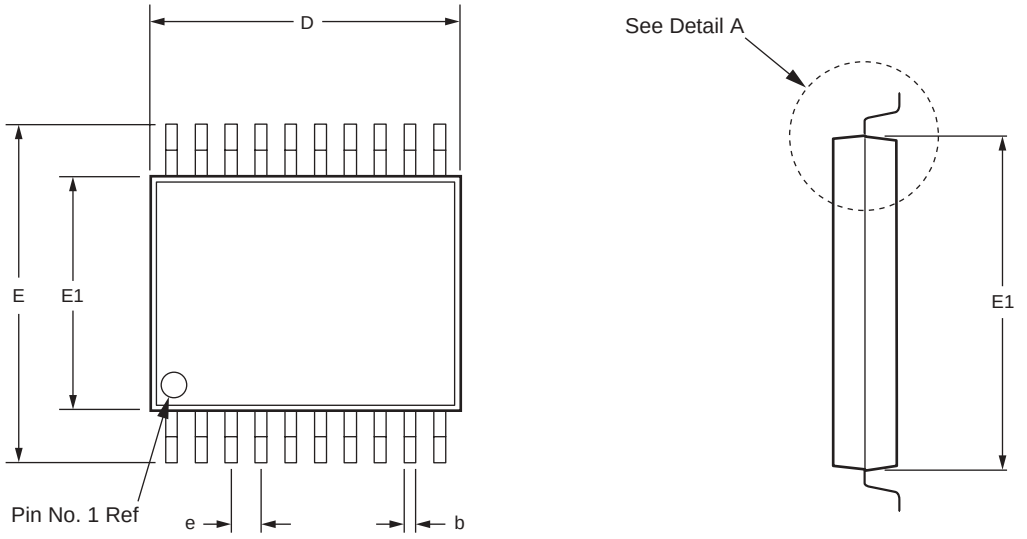
Parameter	Minimum	Typical	Maximum	Units
Gain variation vs. frequency (902–928 MHz)		±0.15	±0.75	dB
Peak-Envelope output Power (PEP)(2)	18	21	22	dBm
RF gain	26	29	30	dB
Total supply current: Output PEP = 21 dBm Output PEP = 11 dBm Output PEP = 1 dBm Sleep mode(5)		 95(2) 40(3) 30(4) < 1		 mA mA mA µA
IM3: PEP ≤ 21 dBm		–21	–17	dBc
Output VSWR for unconditional stability			10:1	
RF input return loss (902–928 MHz)			–9.5	dB
RF output-to-input isolation @ 915 MHz		50		dB
RF input impedance		50		Ω
RFOUT passband 3dB BW around 915 MHz	250			MHz
V_{IH} for ENABLE	1.9			V
V_{IL} for ENABLE			0.8	V
I_{IH} for ENABLE		50	60	µA
I_{IL} for ENABLE	–10	–1	0	µA
Power supply for specified performance	3.0	3.6	5.0	V
Power supply range	2.7	3.6	5.0	V
Power added efficiency		36%		
Operating temperature range	–10	25	70	°C

FOOTNOTE::
(1) Test conditions: T_A = 25 °C, V_{CC} = 3.3V, f_{REF} = 915 MHz.
(2) With continuous wave RF input signal of –8 dBm.
(3) With continuous wave RF input signal of –18 dBm.
(4) With continuous wave RF input signal of –28 dBm.
(5) When ENABLE (pin 10) is low.

Device Dimensions

Package dimensions for the RF106 are given in Figure 3.

Figure 3. Package Dimensions — 20-Pin TSSOP



Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.20 MAX.		0.0473 MAX.	
A1	0.05	0.10	0.0020	0.0039
A2	0.90 NOM.		0.0354 NOM.	
D	6.45	6.55	0.2540	0.2580
E	6.30	6.50	0.2481	0.2560
E1	4.30	4.50	0.1694	0.1772
L	0.50	0.75	0.0197	0.0295
L1	1.00 REF.		0.0394 REF.	
e	0.65 BSC.		0.0256 BSC.	
b	0.17	0.27	0.0067	0.0106
c	0.13	0.20	0.0051	0.0079
Coplanarity	0.08 MAX.		0.003 MAX.	
Ref: 20-Pin TSSOP (GP00-D296)				
*Metric values (millimeters) should be used for PCB layout. English values (inches) are converted from metric values and may contain round-off errors.				

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Ordering Information

Model Number	Package	Operating Temperature
RF106-12	—	—

Revision History

Revision	Level	Date	Description
A		Feb. 1, 1998	Initial release
B		August 26, 2002	Minor changes

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