

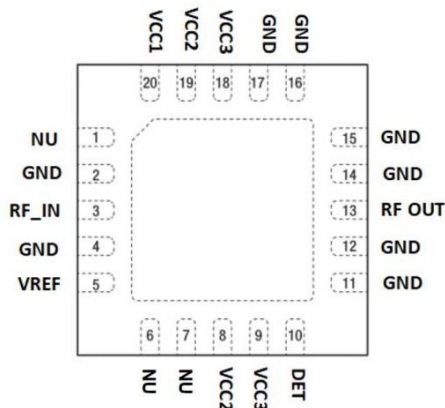
# 5 GHz, 27dBm Power Amplifier with Powe Detector

## Applications

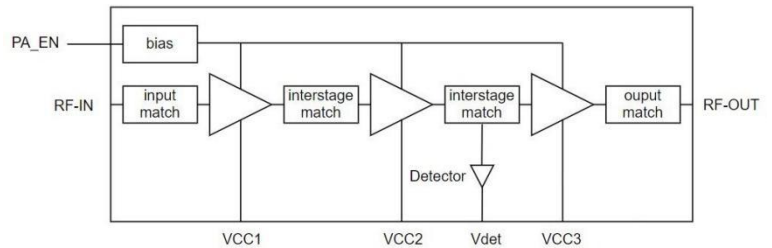
- 5 GHz WLAN (IEEE802.11a)
- 5 GHz WLAN (IEEE802.11n)
- Media gateways
- Set-top boxes
- LCD TVS

## Features

- +28dBm, DEV<sub>M</sub> ≤ 3.0 % @ +5.5V, 11n MCS7
- High gain of ≥ 35.5 dB @ +5.5V
- On-chip power detector
- 4x4x0.9 mm 20-Pin QFN package
- RoHS compliant product
- 



**Figure 2. SE5004L Pinout – 20 Pin QFN (Top View)**



**Figure 1. SE5004L Block Diagram**

## Description

The SE5004L is a 5GHz power amplifier offering high linear power for wireless LAN applications. The SE5004L incorporates a power detector for closed loop monitoring and control of the output power.

The device is sold in a RoHS compliant miniature 4 x 4 x 0.98mm 20-pin QFN package to make automated assembly simple. Its small and thin package size makes the device an ideal solution for radios built in small form factors for mobile applications.

**Table 1. SE5004L Signal Descriptions**

| Pin # | Name  | Description                                         | Pin # | Name   | Description                                     |
|-------|-------|-----------------------------------------------------|-------|--------|-------------------------------------------------|
| 1     | NU    | Pin is not used, and is open circuit in the package | 11    | GND    | Ground                                          |
| 2     | GND   | Ground                                              | 12    | GND    | Ground                                          |
| 3     | RF_IN | RF Input                                            | 13    | RF_OUT | RF output                                       |
| 4     | GND   | Ground                                              | 14    | GND    | Ground                                          |
| 5     | VREF  | Reference Voltage                                   | 15    | GND    | Ground                                          |
| 6     | NU    | Pin is not used, and is open circuit in the package | 16    | GND    | Ground                                          |
| 7     | NU    | Pin is not used, and is open circuit in the package | 17    | GND    | Ground                                          |
| 8     | VCC2  | Supply voltage, 2 <sup>nd</sup> stage of the PA     | 18    | VCC3   | Supply voltage, 3 <sup>rd</sup> stage of the PA |
| 9     | VCC3  | Supply voltage, 3 <sup>rd</sup> stage of the PA     | 19    | VCC2   | Supply voltage, 2 <sup>nd</sup> stage of the PA |
| 10    | DET   | Detector output voltage                             | 20    | VCC1   | Supply voltage, 1 <sup>st</sup> stage of the PA |

## Electrical Specifications

The absolute maximum ratings of the SE5004L are provided in Table 2. The DC electrical characteristics and AC electrical characteristics are also provided in Tables 3 and 4, respectively.

**Table 2. Absolute Maximum Ratings**

| Parameter                                                    | Min. | Max. | Units | Comments            |
|--------------------------------------------------------------|------|------|-------|---------------------|
| VCC1, VCC2, VCC3                                             | -0.5 | +6   | V     | RF OFF              |
| Collector Current                                            |      | 1.2  | A     |                     |
| RF Input Power                                               |      | +10  | dBm   | CW                  |
| Operating Temperature Range                                  | -40  | +85  | °C    |                     |
| Maximum Junction Temperature                                 |      | +175 | °C    |                     |
| Storage Temperature Range                                    | -40  | +125 | °C    |                     |
| Soldering Conditions                                         |      | +260 | °C    | Peak for 20 Seconds |
| Electrostatic discharge:<br>Human Body Model (HBM), Class 1B |      | 1000 | V     |                     |

**Note:** Stress in excess of the absolute maximum ratings may cause permanent damage to the devices.

**Table 3. DC Electrical Characteristics (Temp.=+25°C)**

| Parameter              | Condition         | Min. | Typ. | Max. | Units |
|------------------------|-------------------|------|------|------|-------|
| <b>Supply Voltages</b> |                   |      |      |      |       |
| VCC1, VCC2, VCC3       |                   | 3.0  | 5.5  | 6.0  | Volts |
| EN                     |                   | 2.6  | 3    | 3.3  | Volts |
| <b>Supply Currents</b> |                   |      |      |      |       |
| Icq @VCC1/2/3=+5V      | Quiescent (no RF) |      | 500  |      | mA    |

**Table 4. AC Electrical Characteristics (VCC1,2,3=+5.5V, EN=+3V, Temp.=+25°C)**

| Parameter                     | Condition         | Min. | Typ. | Max.  | Units |
|-------------------------------|-------------------|------|------|-------|-------|
| RF Frequency Range (Note 1)   |                   | 5.15 |      | 5.925 | GHz   |
| Gain                          |                   |      | 35.5 |       | dB    |
| P1dB                          |                   |      | 33.5 |       | dBm   |
| Peak Power                    |                   |      | 35.5 |       | dBm   |
| S11 (Input Return Loss)  S11  |                   |      | 14   |       | dB    |
| S22 (Output Return Loss)  S22 |                   |      | 11   |       | dB    |
| Detector Voltage Range        | No RF             |      | 0.25 |       | V     |
|                               | Pout = +25dBm     |      | 1    |       | V     |
|                               | Pout = +26dBm     |      | 1.1  |       | V     |
|                               | Pout = +27dBm     |      | 1.2  |       | V     |
| Current Consumption           | Modulated signal: |      |      |       |       |
|                               | @quiescent        |      | 500  |       | mA    |
|                               | @+15dBm           |      | 550  |       |       |
|                               | @+20dBm           |      | 620  |       |       |
|                               | @+23dBm           |      | 680  |       |       |

|                   |                                      |  |         |  |         |
|-------------------|--------------------------------------|--|---------|--|---------|
| Output Power      | MCS9, VHT80= -35dB DEVM              |  | 27      |  | dBm     |
|                   | MCS7, HT40= -30dB DEVM               |  | 28      |  | dBm     |
|                   | 802.11a, 54Mbps, 64 QAM, 3% EVM      |  | TBD     |  | dBm     |
|                   | 802.11N, H T 2 0 , M C S 0 , 3 % EVM |  | 28      |  | dBm     |
|                   | MCS0, HT20, mask with 0 dB margin    |  | 31      |  | dBm     |
| 2fo/3fo harmonics | Pout = +26dBm (HT20 MCS0)            |  | -44/-36 |  | dBm/MHz |

**Note 1:** Operation outside this range is possible, but not guaranteed.

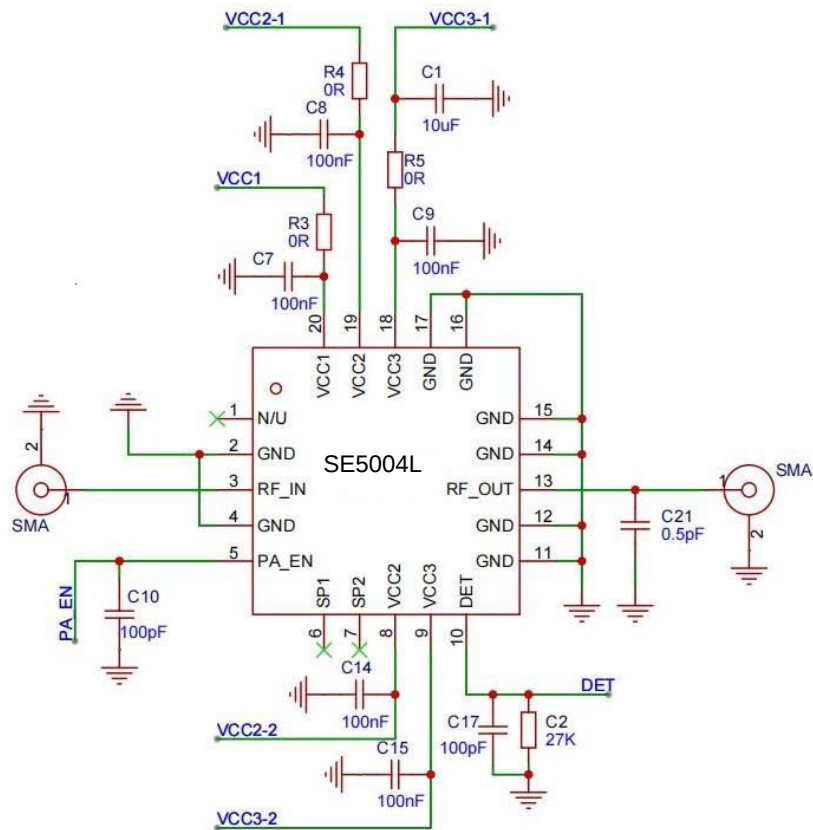


Figure 3. SE5004L Application Schematic

# Package Drawing

