



Current RF

CC-204IP

WideBand RF PA

6Mhz to 5.8Ghz Output Frequency Range

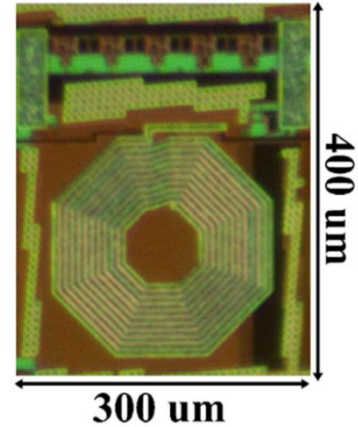
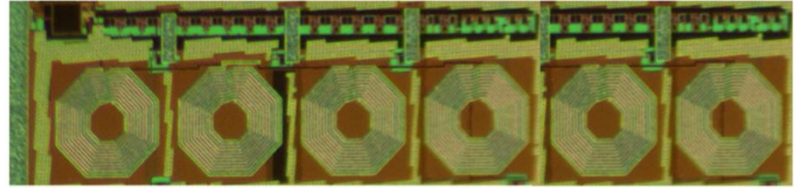
Class AB Operation

1.4 to 3 Noise Figure

+2dBm to +12dBm RF Output

-30 dBm Out Band Spurious Emissions

Digitally Controlled Cascaded Stages



Single Cell

General Description

The CC-204IP Wideband Power Amplifier is a paralleled, multi-stage RF Power Amplifier that possesses a variable 6Mhz to 5.8Ghz output frequency range and scalable power output gain varying for +2dBm to +16dBm. The CC-204IP Power Amplifier can be configured as a single stage or multiple paralleled stages, dependent on needed output drive power and noise figure. The basic cell is 300um X 400um but can be smaller in dimension depending on antenna impedance and PA center frequency. For 6 paralleled stages, the total area is 848um X 848um. The present inductor area is 735um X 735um for 6 stages. As the needed inductor shrinks, or if circuits are allowed under the inductor, the overall PA area shrinks. The RF PA amplifier is designed to be bandgap current source controlled (a bandgap can be included in the IP as an option), and as such is stable over temperature. The architecture gain is designed to be digitally switched stage controlled and analog adjusted via controlled tail current sources in the amplifier itself. The PA architecture can be a single stage or paralleled for additional RF power output. The impedances of each cascaded PA stage can be adjusted to directly match any given antenna, making the IP adjustably matched to any antenna environment.

Topology

WideBand CMOS Architecture
Adjustable Antenna Matching
Selectable/Tunable Output Gain
Proprietary Topology

Features

RFID Compatible
RF Power Transmission Compatible
RF Transceiver Compatible
Analog and Digitally Tunable

Functional Description

The CC-204IP Wideband RF PA is a broadband, tunable Power Amplifier, centering on output Power Frequencies ranging from 6 Mhz to 5.8Ghz. The PA is a class AB architecture, which allows a very linear tuning range, high output linearity, and excellent noise figure. The PA, as shown in Figure 1 is digitally tunable within a given frequency range, and is made broadband with selected ranges within various frequency bands.

Figure 1 shows the architecture of the single cell PA and the tuning capabilities of the cell. The cell can be outfitted with a bandgap reference which supplies the Ref_in reference and needed tail current sources for PA temperature stability.

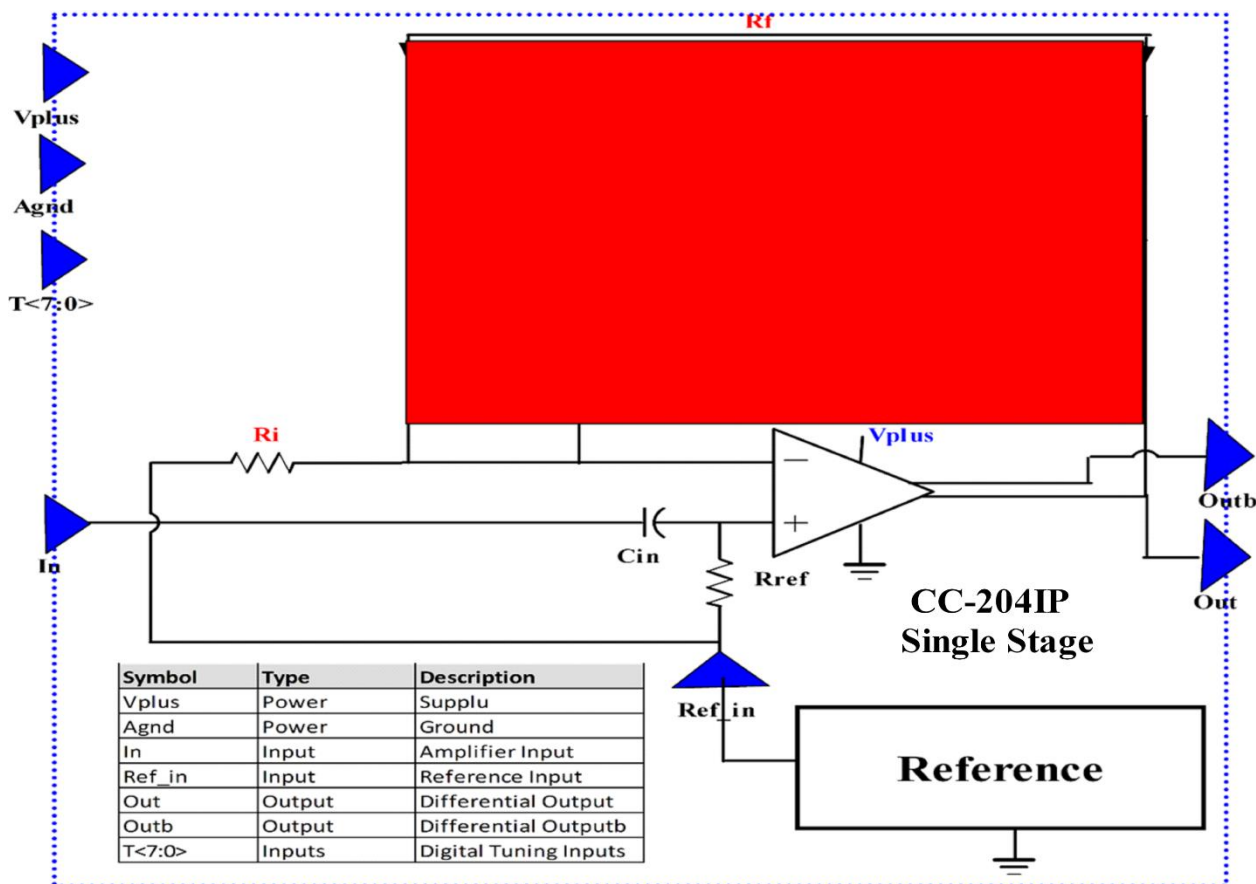


Figure 1: CC-204IP RF PA Single Cell

Figure 2 shows the composite multi-paralleled stage CC-204IP Wideband RF PA. Each CC-204IP stage is connected in parallel with the output antenna, the output impedance of each stage adjusted in such a manner to assure maximum impedance and frequency antenna output

matching to the transmit antenna. The architecture in Figure 2 is designed in such a manner so the current gain and phase of each stage is additive. In this manner the Noise figure is kept low, and since current mode circuits are inherently low noise and low impedance, minimum Noise Figure, output gain, and Power Transfer is achieved.

The pinout of the CC-204IP composite PA is shown in Figure 2.

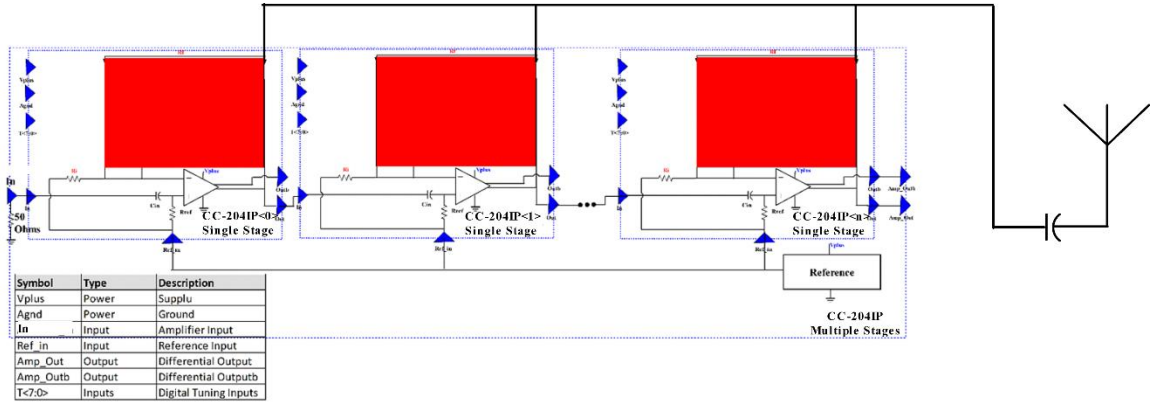


Figure 2: CC-204IP RF PA Paralleled for Current Gain

Specifications (5.8Ghz Operation)

CC-204IP at 5.8Ghz	Specification	min	typical	max	Unit
Center Frequency		5725		5850	Mhz
Output Power		+2		+16	dBm
Output Power Control Range			20		dB
Out Band Spurious Emission	30 Mhz to 1Ghz			-36	dBm
	1Ghz to 12.75Ghz			-30	dBm
	1.8Ghz to 1.9Ghz			-47	dBm

Table 1: 5.8Ghz Operation Specifications

Performance

CC-204IP 5.8Ghz Power Amplifier

The CC-204IP Wideband Power Amplifier is a 6MHz to 5.8GHz RF Power Amplifier that possesses a variable and scalable power output gain varying for +2dBm to +16dBm. The RF PA amplifier is bandgap current source controlled (the bandgap can be included in the IP as an option), and will be stable over temperature. The architecture can be adjusted via controlled tail current sources in the amplifier itself and the PA architecture can be paralleled for additional RF power output. Figure 3 shows the result of driving a +12dBm, 5.8 GHz signal from the outputs of paralleled Power Amplifiers through a T-switch to an antenna with a 10 Ohm characteristic impedance. In this configuration, 6 paralleled, impedance matched Power Amplifiers were used to obtain the +12dBm output signal. Impedances in the individual Power amplifiers can be adjusted to drive an antenna with a 50 ohm characteristic impedance at 5.8GHz. The noise figure of this Power amplifier ranges approximately from 1.4 to 3.

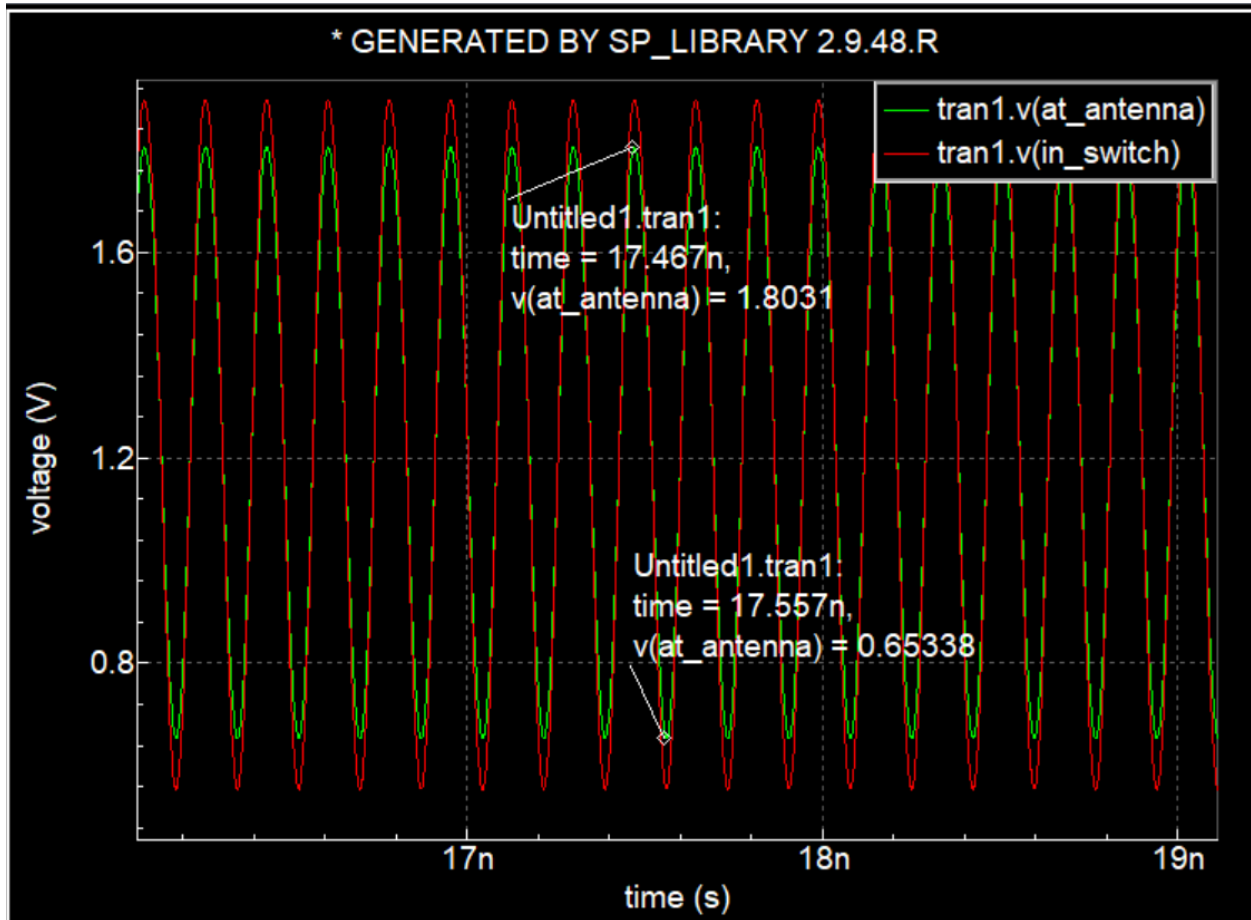


Figure 3: +12dBm into a 10 Ohm Antenna

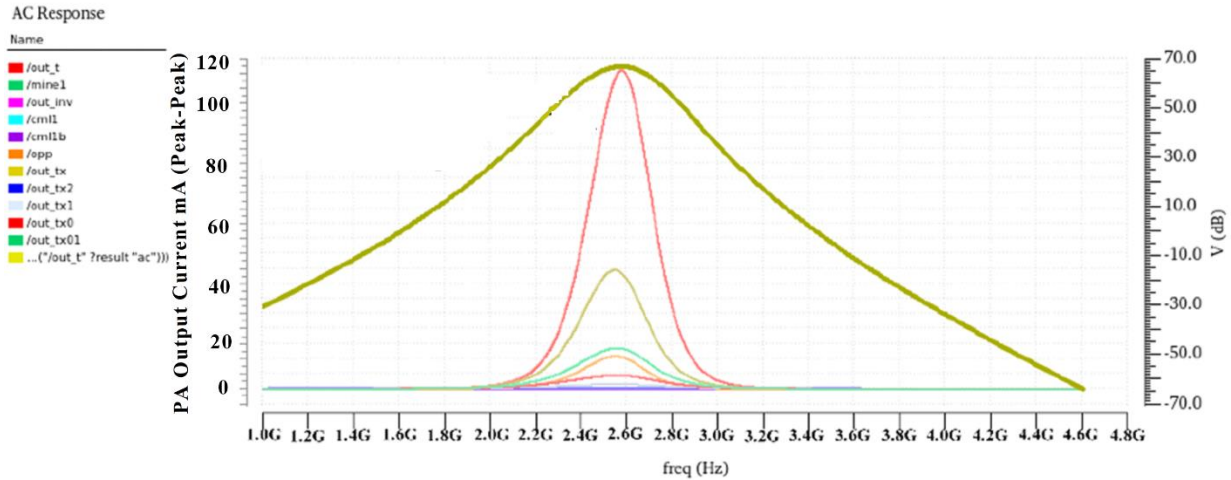


Figure 4:CC-204IP Wideband RF PA Bandwidth at 2.4Ghz

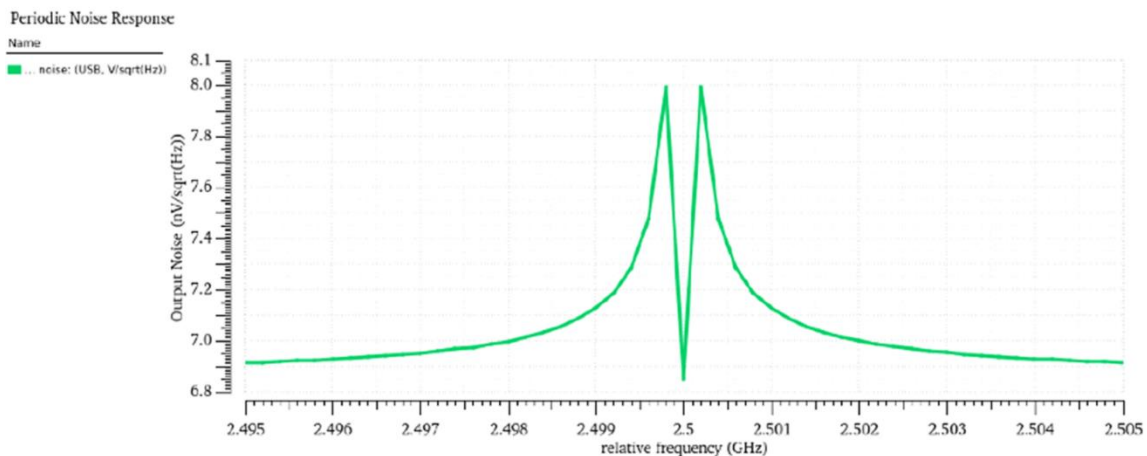


Figure 5:CC-204IP Wideband RF PA Noise Response at 2.4Ghz

Figures 4 and 5 show the bandwidth and noise response of 6 paralleled CC-204IP cells driving a 10 Ohm antenna. The output of the system shown in Figure 2 can be adjusted to drive a 50 Ohm antenna system. The gain is appropriate for a +12dBm output, similar to that shown at 5.8Ghz in Figure 3 and 2.4Ghz in Figure 4, and putting the output at noise floor at -92 dBc at 2.4Ghz, causing the noise figure to range from 1.4 to 3.

For additional technical or ordering information contact us at:



Current RF

8558 Maul Oak Drive

West Jordan, Utah 84081

www.CurrentRF.com

(209)-914-2305

Michael.Hopkins@CurrentRF.com

