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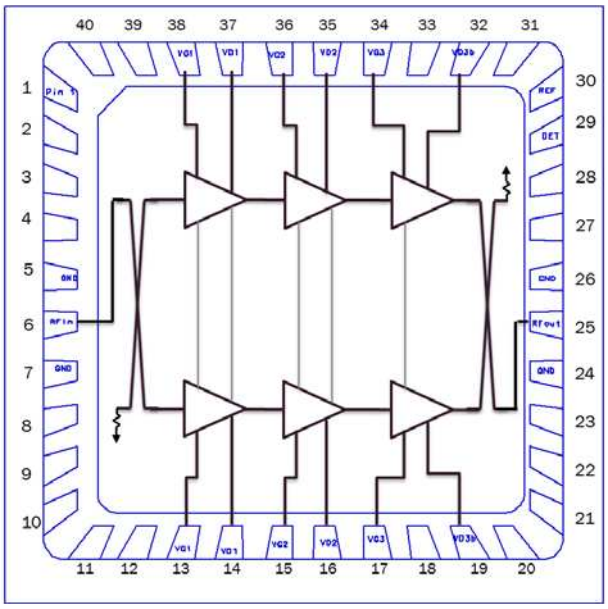
RFPA1003

14.4GHz TO 15.4GHz HIGH LINEARITY POWER AMPLIFIER

Package: Ceramic QFN, 40-pin, 6mm x 6mm x 0.95mm



Functional Block Diagram

Features

- Frequency Range: 14.4GHz to 15.4GHz
- Small Signal Gain: 25dB
- IM3 at +17dBm (SCL): +50dBc
- IM3 at +22dBm (SCL): +40dBc
- IM3 at +25dBm (SCL): +35dBc
- OIP3 at +25dBm (SCL): +42.5dBm
- P1dB: +32.5dBm
- RL (Input): 7dB
- RL (Output): 18dB
- V_D: 7.5V
- I_D: 1.0A
- 6mm x 6mm QFN

Applications

- Point-Point Radio
- Point-Multipoint Radio

Product Description

RFMD's RFPA1003 is a high linearity power amplifier in a surface mount package designed for use in transmitters that operate at frequencies between 14.4GHz to 15.4GHz. It provides 25dB of small-signal gain. This power amplifier is optimized for linear operation with an output third order intercept point (OIP3) of ≥ +42.0dBm. The RFPA1003 is manufactured with depletion mode GaAs pHEMT process.

Ordering Information

RFPA1003S2	2-Piece sample bag
RFPA1003SB	5-Piece bag
RFPA1003SQ	25-Piece bag
RFPA1003SR	100-Piece reel
RFPA1003TR7	750-Piece 7" reel
RFPA1003PCBA-410	Evaluation Board

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ BiFET HBT
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	

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Absolute Maximum Ratings

Parameter	Rating	Unit
V_{D1}, V_{D2}, V_{D3}	+7.7	V
V_G	0	V
Junction Temperature		°C
Continuous P_{DISS} (T = 85 °C) (derate 37 mW/ °C above T = 85 °C)		°C/W
Storage Temperature	-65 to +150	°C
Operating Temperature	-40 to +85	°C
ESD Sensitivity (HBM)		

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Operational Frequency	14.4		15.4	GHz	
Positive Supply Voltage (V_{DD})		7.5		V	
Drain current (I_D)		1000		mA	
Small-signal Gain		25		dB	
Dynamic Range	12	15		dB	
P1dB		32.5		dBm	
OIP3		42.5		dBm	at P_{OUT} = 28dBm (2 tones total power) in 14.4GHz to 15.4GHz frequency range
IM3		50.0		dBc	at P_{OUT} = 20dBm (2 tones total power) in 14.4GHz to 15.4GHz frequency range
		40.0		dBc	at P_{OUT} = 25dBm (2 tones total power) in 14.4GHz to 15.4GHz frequency range
		35.0		dBc	at P_{OUT} = 28dBm (2 tones total power) in 14.4GHz to 15.4GHz frequency range
IM5		78		dBc	at P_{OUT} = 20dBm (2 tones total power) in 14.4GHz to 15.4GHz frequency range
		65		dBc	at P_{OUT} = 25dBm (2 tones total power) in 14.4GHz to 15.4GHz frequency range
Input Return Loss (RL_{IN})		7		dB	
Output Return Loss (RL_{OUT})		18		dB	
Noise Figure				dB	
ESD Sensitivity (HBM)				V	
ESD Sensitivity (MM)				V	
Moisture Sensitivity Level				V	

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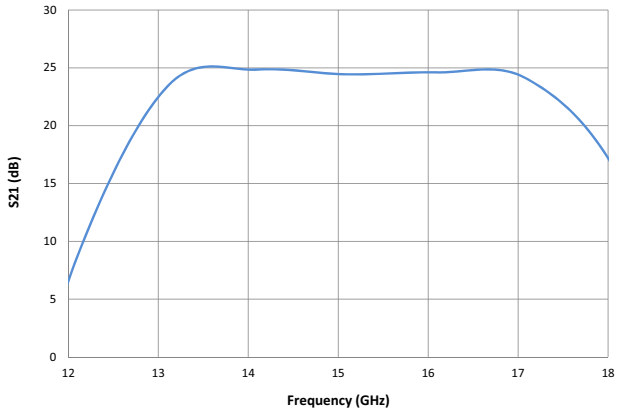
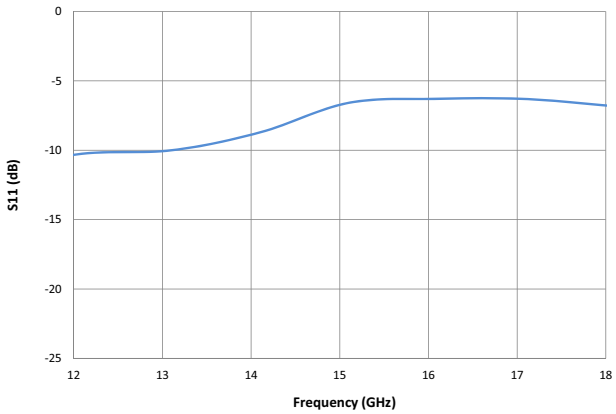
Small Signal Performance

V_{D1} = V_{D2} = V_{D3} = 7.5V, I_{D1} = 172mA, I_{D2} = 180mA, I_{D3} = 600mA

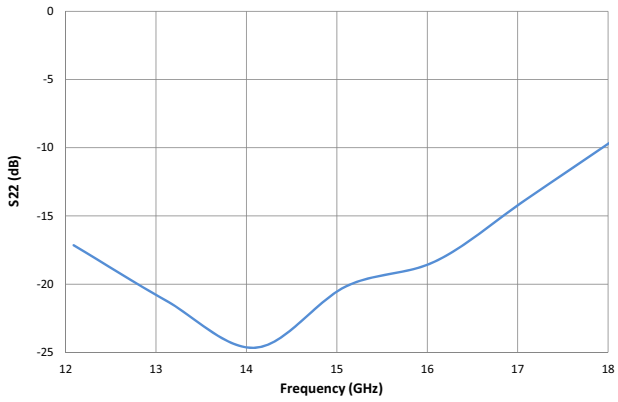
Gain versus Frequency



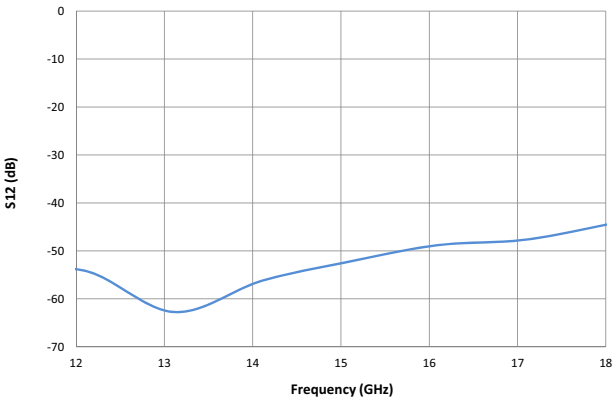
Input RL versus Frequency



Output RL versus Frequency

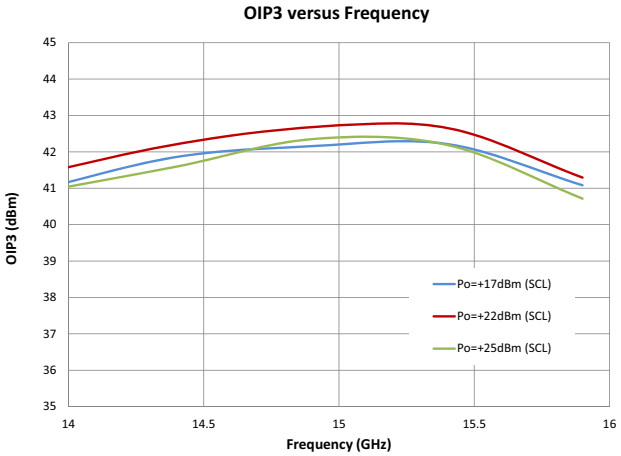


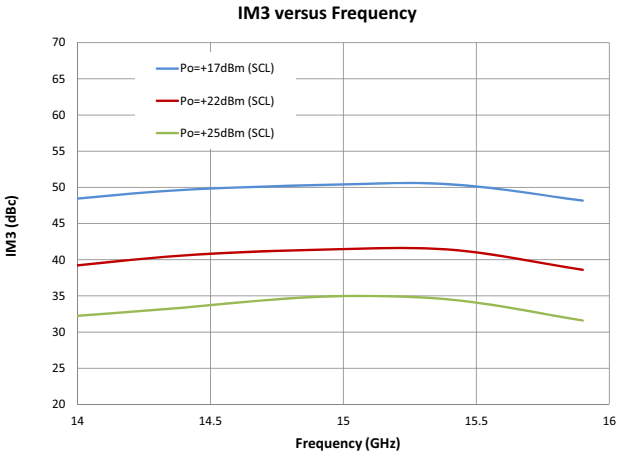
Isolation versus Frequency

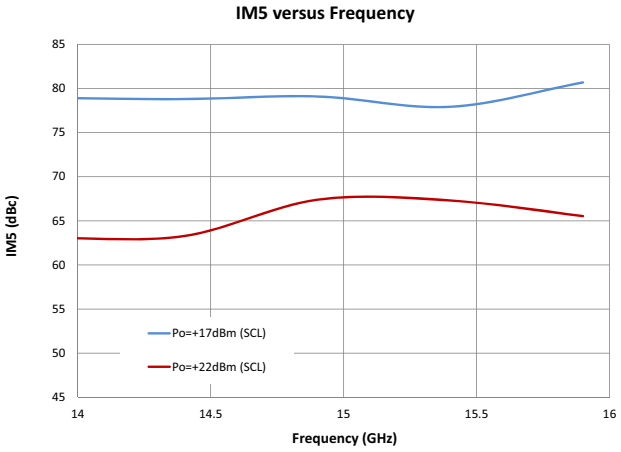


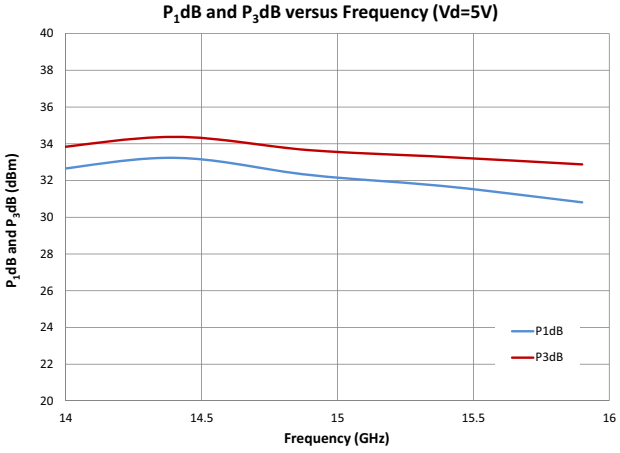
Typical Electrical Performance

V_{D1} = V_{D2} = V_{D3} = 7.5V, I_{D1} = 172mA, I_{D2} = 180mA, I_{D3} = 600mA









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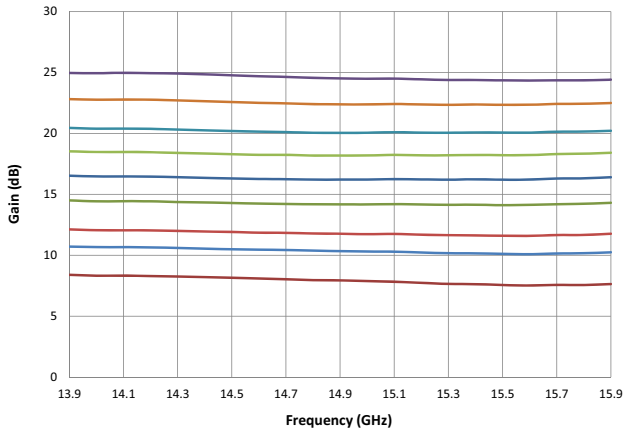
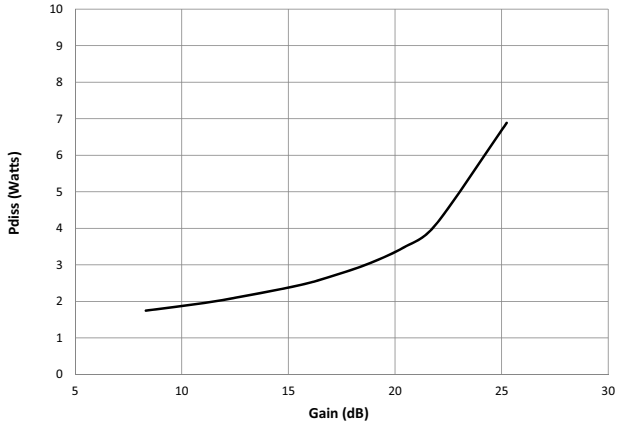
Typical Electrical Performance
(continued)

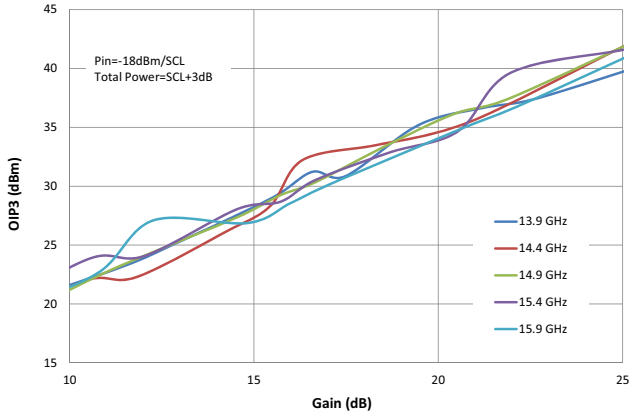
Gain Control using Vg versus Frequency



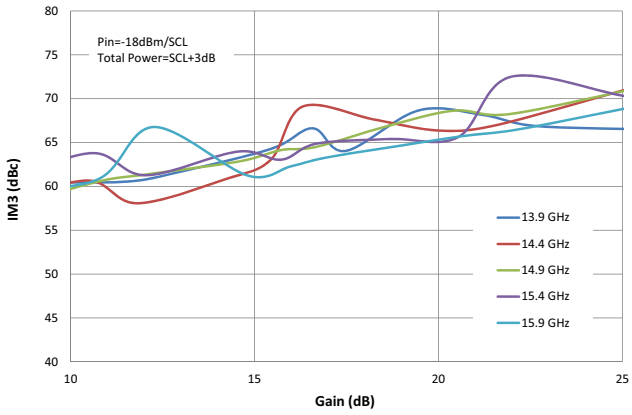
Pdiss versus Gain



OIP3 versus Gain versus Frequency



IM3 versus Gain versus Frequency



Pin Names and Descriptions

Pin	Name	Description
1	N/C	Not connected.
2	N/C	Not connected.
3	N/C	Not connected.
4	N/C	Not connected.
5	GND	Ground.
6	RFIN	RF input.
7	GND	Ground.
8	N/C	Not connected.
9	N/C	Not connected.
10	N/C	Not connected.
11	N/C	Not connected.
12	N/C	Not connected.
13	VG1	Gate bias 1.
14	VD1	Drain bias 1.
15	VG2	Gate bias 2.
16	VD2	Drain bias 2.
17	VG3	Gate bias 3.
18	N/C	Not connected.
19	VD3B	Drain bias 3.
20	N/C	Not connected.
21	N/C	Not connected.
22	N/C	Not connected.
23	N/C	Not connected.
24	GND	Ground.
25	RFOUT	RF output.
26	GND	Ground.
27	N/C	Not connected.
28	N/C	Not connected.
29	DET	Detector Out.
30	REF	Detector Reference.
31	N/C	Not connected.
32	VD3A	Drain bias 3.
33	N/C	Not connected.
34	VG3	Gate bias 3.
35	VD2	Drain bias 2.
36	VG2	Gate bias 2.
37	VD1	Drain bias 1.
38	VG1	Gate bias 1.
39	N/C	Not connected.
40	N/C	Not connected.

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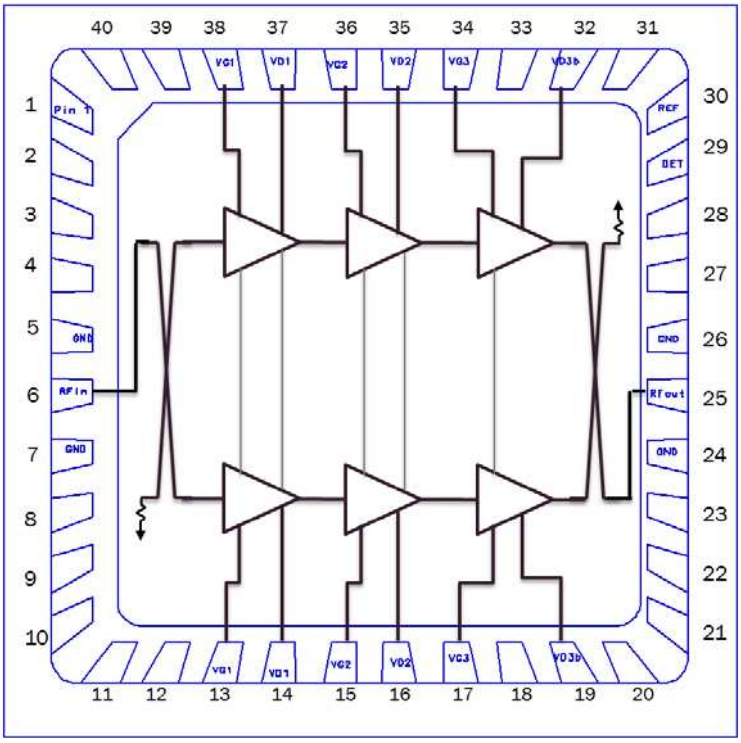
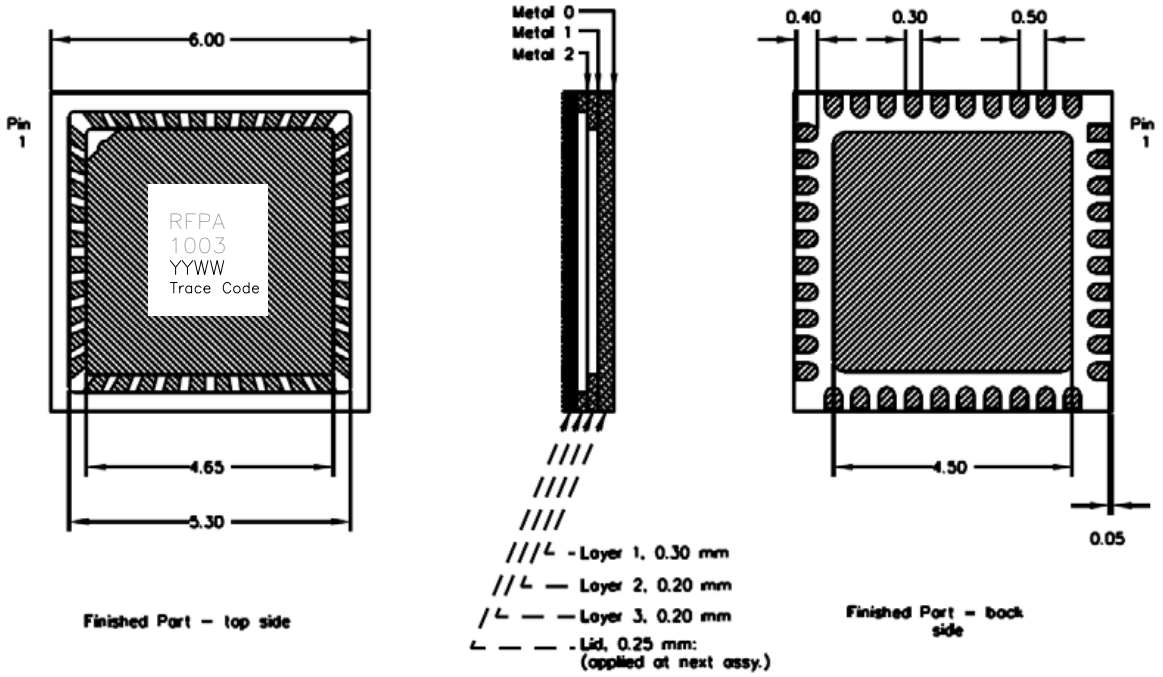
Pin Out

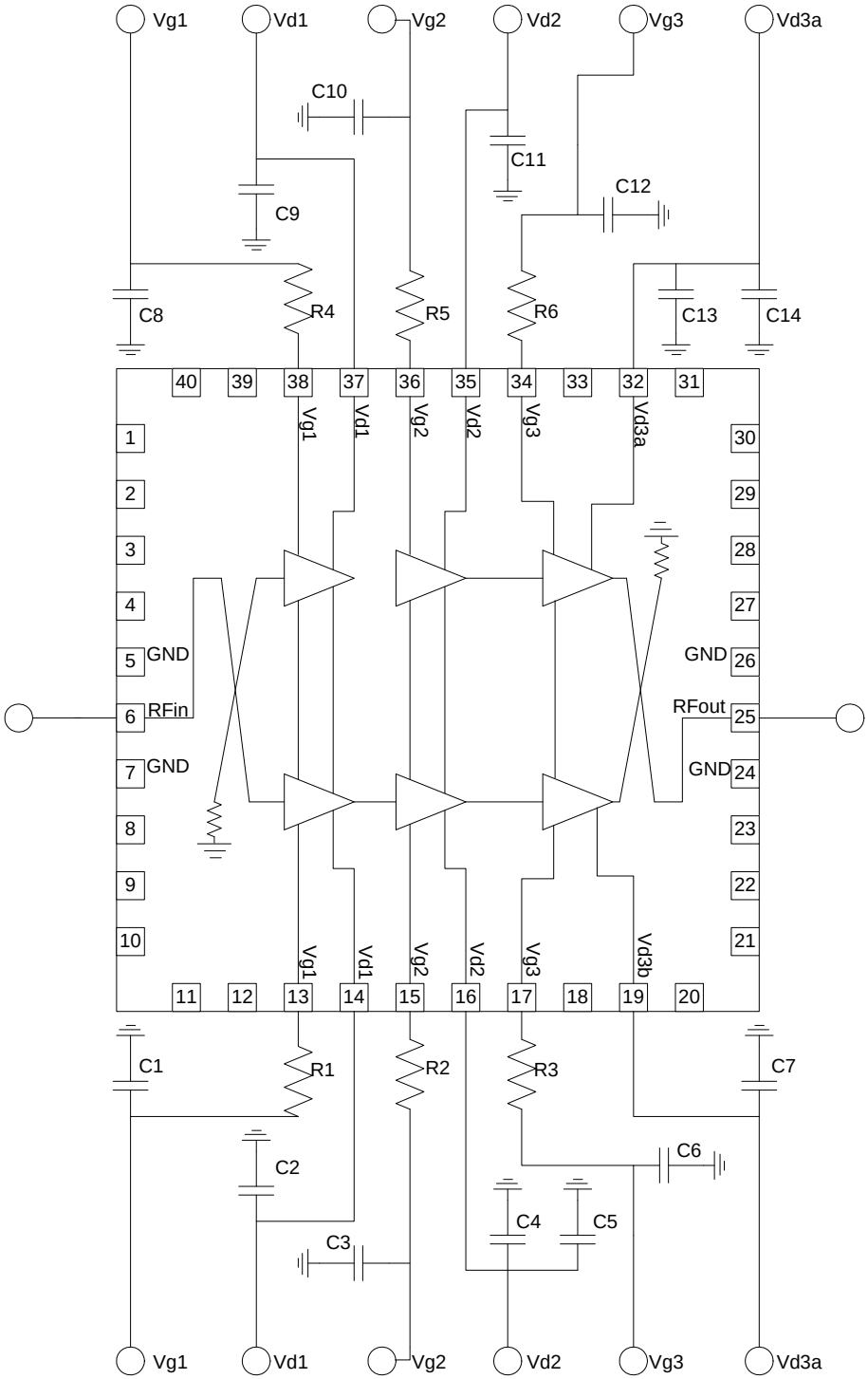


Package Drawing

QFN, 32-Pin, 6mm x 6mm x 0.95mm



Sample Application Circuit Schematic



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Evaluation Board Layout