

Product Description

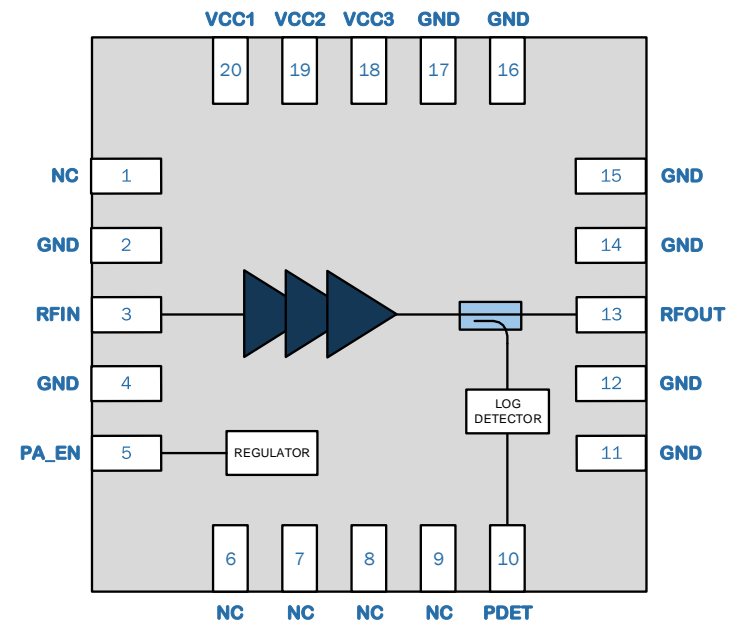
The RFPA5552 is a three-stage power amplifier (PA) designed for Wi-Fi 802.11a/n/ac systems. The compact form factor and integrated matching minimizes layout area in the application and greatly reduces the number of external components.

Performance is focused on optimizing the PA for a 3.3V supply voltage that conserves power consumption while maintaining the highest linear output power and leading edge throughput.

A key feature is the integration of a logarithmic power detector which enables power control across the entire power spectrum for applications which use higher gain antennas or end users wanting to reduce device calibration time in production.

The RFPA5552 integrates a 5GHz power amplifier (PA), regulator and power detector into a single device. The device is provided in 4mm x 4mm x 0.9mm, 20-pin QFN package.

Functional Block Diagram



Package: QFN, 20-pin,
4mm x 4mm x 0.9mm max

Feature Overview

- $P_{OUT} = +21\text{dBm}$, 802.11ac, VHT80 MCS9 at -35dB Dynamic EVM
- $P_{OUT} = +22\text{dBm}$, 802.11n, HT20/40 MCS7 at -30dB Dynamic EVM
- $P_{OUT} = +24\text{dBm}$, HT20 MCS0 at Spectral Mask Compliance
- Optimized for 3.3V Operation
- Typical Gain 32dB
- Low Power Consumption $<1\text{W}$ at +21dBm
- Integrated Logarithm Power Detector
- Input and Output Matched to 50Ω

Applications

- Wireless Routers
- Access Points
- Residential Gateways
- Consumer Premise Equipment
- Internet of Things

Ordering Information

PART NUMBER	DESCRIPTION
RFPA5552SB	Sample bag with 5 pieces
RFPA5552SQ	Sample bag with 25 pieces
RFPA5552SR	7" Reel with 100 pieces
RFPA5552TR13	13" Reel with 2,500 pieces
RFPA5552PCK-410	Assembled Evaluation Board + 5 pieces



Absolute Maximum Ratings

PARAMETER	RATING	UNIT
DC Supply Voltage (No RF Applied)	-0.5 to +6	V _{DC}
DC Supply Current	1000	mA
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C
Maximum TX Input Power into 50Ω, 10:1 Load for 11a/n/ac (No Damage)	+10	dBm

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. This is an InGaP device designed for high duty cycle applications with T_j>30 °C over ambient

Nominal Operating Parameters

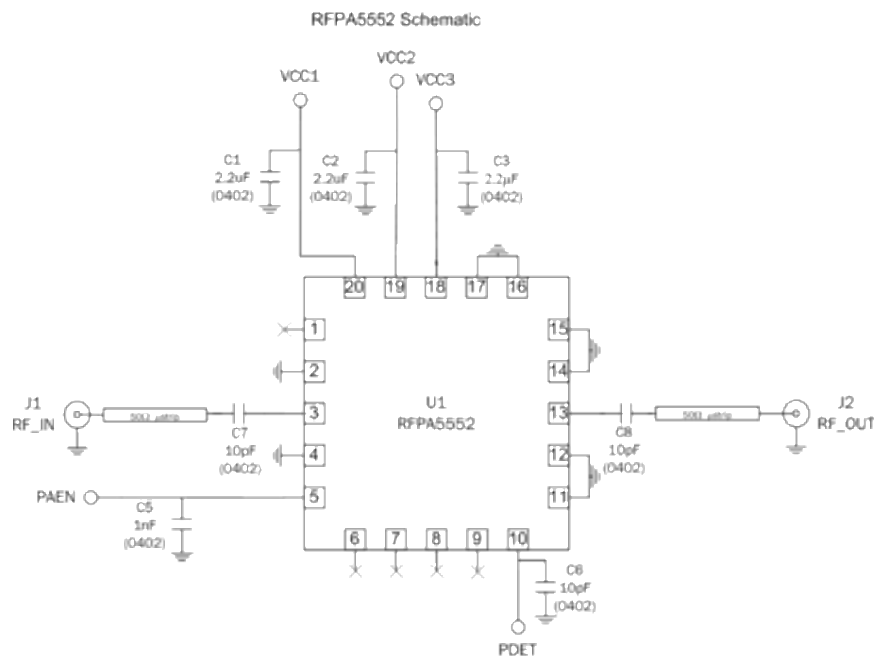
PARAMETER	MIN	TYP	MAX	UNIT	CONDITION
COMPLIANCE					802.11A, 802.11N, 802.11AC
Operating Frequency	5.180		5.925	GHz	
Extended Operating Frequency	4.9		5.925	GHz	
Power Supply V _{CC}	3	3.3	3.6	V	
PA Enable Voltage-High	2.8	3.1	V _{CC}	V	PA_EN
PA Enable Voltage-Low	0		0.2	V	PA_EN

TRANSMIT PERFORMANCE					V _{CC} =3.3V, T=+25°C, V _{PAEN} =3V, PA_EN=High; Unless otherwise noted
11ac VHT160 Output Power		20		dBm	MCS9
Dynamic EVM		1.3	1.8	%	
		-38	-35	dB	
11ac VHT80 Output Power	20	21		dBm	MCS9
Dynamic EVM		1.3	1.8	%	
		-38	-35	dB	
11n HT20/40 Output Power	20.5	22		dBm	MCS7
Dynamic EVM		2.5	3.2	%	
		-32	-30	dB	
Margin to 802.11ac 160MHz Spectral Mask		5	0	dBc	P _{OUT} = +21dBm, MCS0
Margin to 802.11ac 80MHz Spectral Mask		5	0	dBc	P _{OUT} = +23dBm, MCS0
Margin to 802.11n 20MHz Spectral Mask		6	0	dBc	P _{OUT} = +24dBm, MCS0
Gain	30	32		dB	

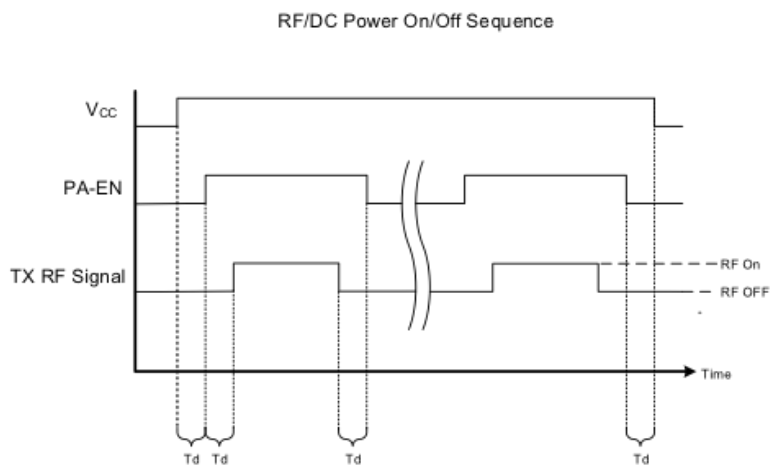
PARAMETER	MIN	TYP	MAX	UNIT	CONDITION
Out of Band Gain		-10	-5	dB	$f = 3200\text{-}3900\text{MHz}$
			12	dB	$f > 7000\text{MHz}$
Quiescent Current		150		mA	RF=Off
Operating Current		275	340	mA	$P_{\text{OUT}} = +21\text{dBm}$
		350	400	mA	$P_{\text{OUT}} = +24\text{dBm}$
RFIN Port Return Loss		12		dB	
RFOUT Port Return Loss		8		dB	
2 nd Harmonics		-42	-35	dBm/MHz	$P_{\text{OUT}} = +24\text{dBm}$ 802.11a 6Mbps
3 rd Harmonics		-42	-35	dBm/MHz	$P_{\text{OUT}} = +24\text{dBm}$ 802.11a 6Mbps
Power Detector Voltage		0.23		mV	RF Off
		0.28		mV	$P_{\text{OUT}} = 0\text{dBm}$
		0.76		mV	$P_{\text{OUT}} = +24\text{dBm}$
Power Detector Slope		20		mV/dB	

GENERAL SPECIFICATIONS					
Stability					
Output VSWR			6:1		CW signal. No spurious above -41.25dBm/MHz for non-harmonic related signals.
Output Power Range	0		24	dBm	
Output $P_{1\text{dB}}$		30		dBm	
Ramp ON/OFF Time		200		nS	10%<->90%; Referencing from control voltage to RF power
Thermal Resistance		27		°C/W	

Evaluation Board Schematic



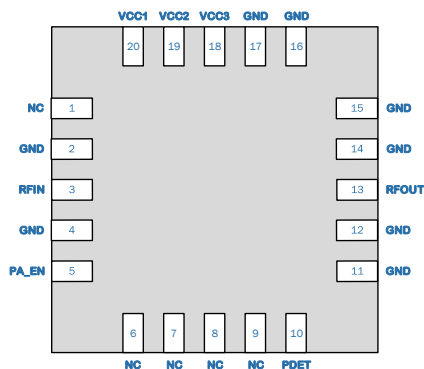
Transmit Timing Diagram



Note: Observe the timing sequence shown in the diagram above and described below.
DC and RF signal levels per data sheet specification

- Apply V_{CC} prior to turning on or pulsing PA enable.
- Turn off PA enable prior to turning off V_{CC} .
- Turn on PA enable prior to applying RF signal.
- Turn off RF signal prior to turning off PA enable.

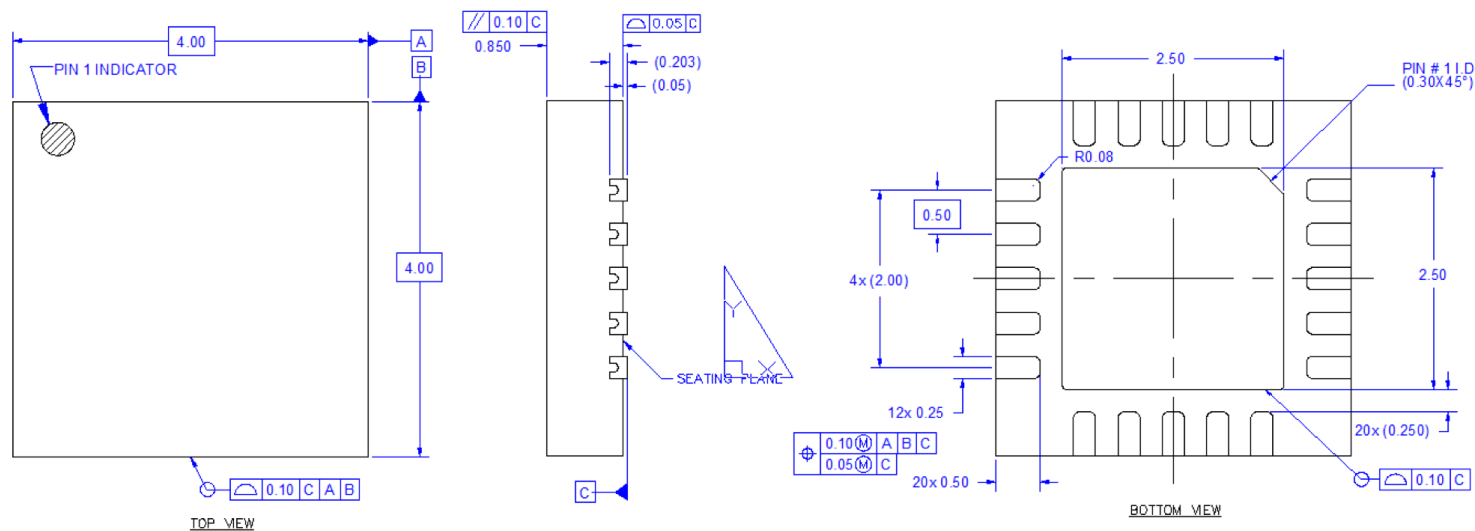
Pin Out



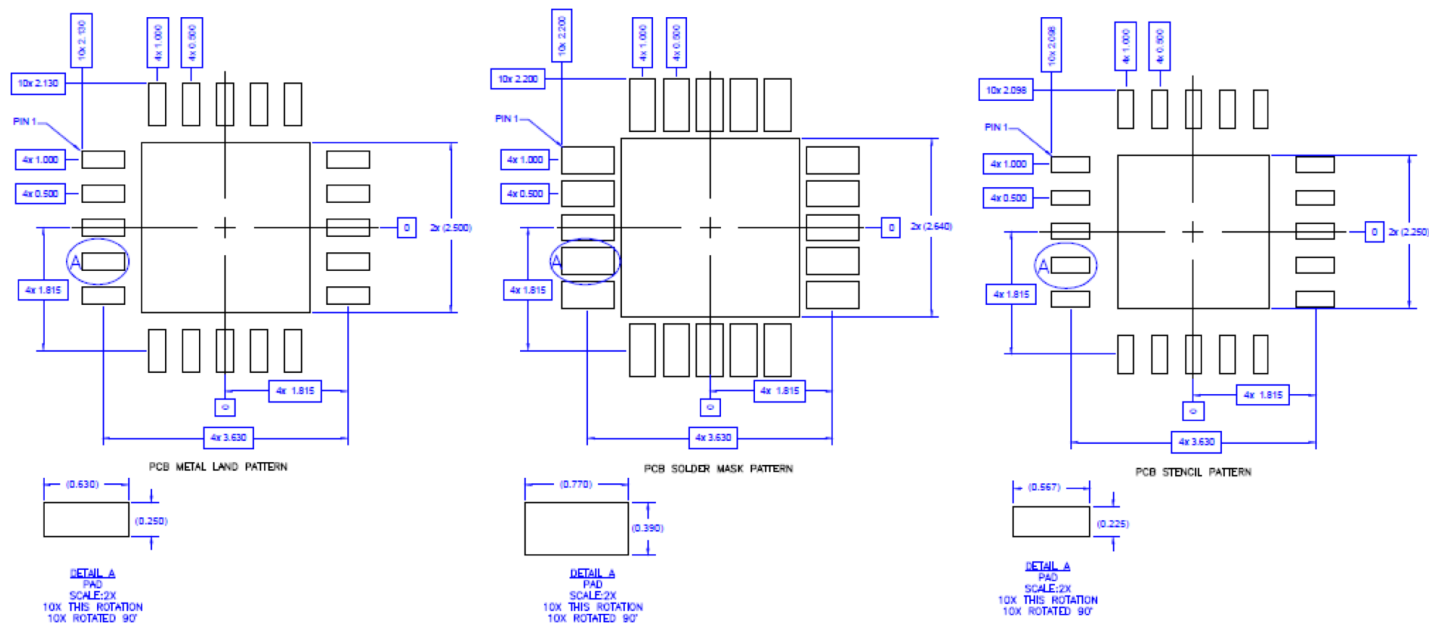
Pin Names and Descriptions

PIN	NAME	DESCRIPTION
1	NC	Not connected internally. It may be left floating or connected to ground.
2	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
3	RFIN	RF input, internally matched to 50Ω and DC shorted. External DC blocking capacitor required.
4	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
5	PAEN	Input enable bias voltage (regulated internally).
6	NC	Not connected internally. It may be left floating or connected to ground.
7	NC	Not connected internally. It may be left floating or connected to ground.
8	NC	Not connected internally. It may be left floating or connected to ground.
9	NC	Not connected internally. It may be left floating or connected to ground.
10	PDET	Power detector. Provides an output voltage proportional to the RF output power level.
11	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
12	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
13	RFOUT	RF output, internally matched to 50Ω and DC shorted. External DC blocking capacitor required.
14	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
15	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
16	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
17	GND	Ground connection. Not connected internally and can be left floating or connected to ground.
18	VCC3	Third stage supply voltage
19	VCC2	Second stage supply voltage.
20	VCC1	First stage supply voltage.
Pkg Base	GND	Ground connection. The back side of the package should be connected to the ground plan though as short of a connection as possible. PCB vias under the device are recommended.

Package Outline (Dimensions in millimeters)



PCB Mounting Pattern (Dimensions in millimeters)



Product Compliance Information



Caution! ESD-Sensitive Device

ESD Sensitivity Ratings

ESD Rating: Class 1C
Voltage: Passes $\geq 1500V$
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: Class C3
Voltage: Passes $\geq 500V$
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101

MSL Rating

MSL Rating: Level 2
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

Compatible with both lead-free (260 °C max. reflow temperature) and tin/lead (245 °C max. reflow temperature) soldering processes.

RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

Contact Information

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