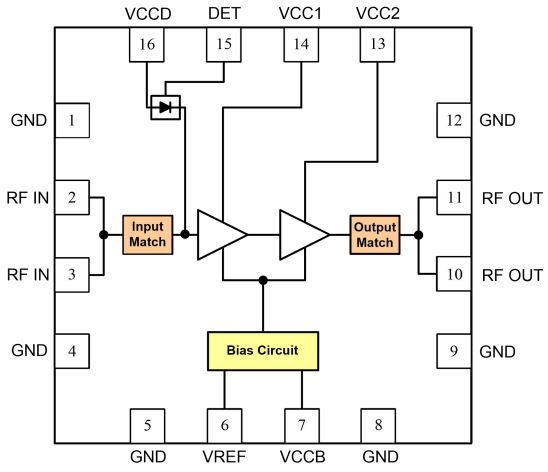
RoHS & Pb-Free Product

Features

- 4.0~6.2GHz Frequency Range
- 3.3V~5.5V Supply Voltage
- 3.0% EVM@24dBm for 802.11a 54Mbps, 5.5V
- 3.0% EVM@22.5dBm for 802.11a 54Mbps, 5V
- 2.5% EVM@18dBm for 802.11a 54Mbps, 3.3V
- 240mA Quiescent Current
- 22dB Gain (Typ.)
- >20dB Input Return Loss@5.8GHz
- On-Chip Power Detector



Functional Block Diagram

Applications

- IEEE 802.11a/n WLAN
- IEEE 802.16 WiMax
- 5.8GHz RFID
- Spread-Spectrum and MMDS Systems

Product Description

The YP552228 is a 2-stage 4.0-6.2GHz high efficiency, high linearity power amplifier based on InGaP/GaAs HBT technology, which is optimized for the applications in bands from 5200MHz to 5800MHz (It needs different matching circuit for different frequency range). The amplifier provides a typical gain of 22 dB and P1dB power of 30.5 dBm, typical bias condition is 5.5V at 240 mA. The input and output are internally matched to 50Ω and require a minimum of external matching components to cover the entire 4.0GHz to 6.2GHz. The YP552228 is assembled in a 16-pin, 4mm × 4mm, QFN package.

Ordering Information

- YP552228 5.8GHz Linear Power Amplifier
- YP552228EVB-1 5.2GHz to 5.8GHz Evaluation PCB

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■ YP552228EVB-2 5.6GHz to 5.9GHz Evaluation PCB

Pin Description

Pin No.	Symbol	Description
1, 4,5, 8, 9, 12	NC/GND	No connection or Ground connection
2, 3	RF IN	RF input
6	VREF	Bias voltage
7	VCCB	Supply voltage for bias
10, 11	RF OUT	RF output
13 / 14	VCC2 / VCC1	Supply voltage for the 2nd / 1st stage
15	DET	Provides an output voltage proportional to the RF level
16	VCCD	Supply voltage for power detector
PKG Base	GND	Ground connection

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Input RF Power	RF IN	+14	dBm
Supply Voltage	VCC1,VCC2, VCCB	-0.5 to +7.0	V
Reference Voltage	VREF	-0.5 to +4.0	V
Operating Ambient Temperature	T_{OP}	-40 to +85	°C
Storage Temperature	T_{ST}	-40 to +150	°C

Caution! ESD sensitive device.

ESD Rating: Class1C
Value: Passes≥1000V min.
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: Class IV
Value: Passes ≥1000V min.
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101

MSL Rating: Level 3 at +260 °C convection reflow
Standard: JEDEC Standard J-STD-020

Electrical Specifications

Table 1-1 Test Frequency: 5.6 to 5.9GHz, Supply Voltage=5.5V

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC1=VCC2=VCCB=5.5V, ICQ=240mA, T_{OP}= +25°C, Freq=5.6GHz to 5.9GHz
Frequency Range	5.6	5.8	5.9	GHz	
Output Power@1dB Compression		30.5		dBm	5.8 GHz
Gain		21.5		dB	5.8 GHz
EVM		3.0	3.2	%	@Pout=+24dBm, 5.8 GHz 802.11a, 54 Mbps, 64QAM
Power Supply					
Reference Voltage, VREF		2.83		V	
Quiescent Current (Total), ICQ		240		mA	

Table 1-2 Test Frequency: 5.6 to 5.9GHz, Supply Voltage=5V

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC1=VCC2=VCCB=5V, ICQ =240mA, T_{OP}=+25°C, Freq=5.6GHz to 5.9GHz
Frequency Range	5.6	5.8	5.9	GHz	
Output Power@1dB Compression		29.5		dBm	5.8 GHz
Gain		22		dB	5.8 GHz
EVM		3.0		%	@Pout=+22.5dBm, 5.8 GHz 802.11a, 54 Mbps, 64QAM
Power Supply					
Reference Voltage, VREF		2.87		V	
Quiescent Current (Total), ICQ		240		mA	

Table 2-1 Test Frequency: 5.2 to 5.8GHz, Supply Voltage=5V

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC1=VCC2=VCCB=5V, ICQ=300mA, T_{OP}=+25°C, Freq=5.2GHz to 5.8GHz
Frequency Range	5.2	5.5	5.8	GHz	
Output Power		28	28.5	dBm	5.5 GHz
Gain		22		dB	5.5 GHz
EVM		3.2		%	@Pout=+27dBm, 5.5 GHz 802.16d, 64QAM
		3.2		%	@Pout=+22dBm, 5.5 GHz 802.11a, 54 Mbps, 64QAM
		3.3		%	@Pout=+22dBm, 5.5 GHz 802.11n, 81 Mbps, QPSK
Power Supply					
Reference Voltage, VREF		3.0		V	
Quiescent Current (Total), ICQ		300		mA	

Table 2-2 Test Frequency: 5.2 to 5.8GHz, Supply Voltage=3.3V

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC1=VCC2=VCCB=3.3V, ICQ=300mA, T_{OP}=+25°C, Freq=5.2GHz to 5.8GHz
Frequency Range	5.2	5.5	5.8	GHz	
Output Power		25	25.5	dBm	5.5 GHz
Gain		21		dB	5.5 GHz
EVM		2.6		%	@Pout=+23dBm, 5.5 GHz 802.16d, 64QAM
		2.3		%	@Pout=+18dBm, 5.5 GHz 802.11a, 54 Mbps, 64QAM
		2.4		%	@Pout=+17dBm, 5.5 GHz 802.11n, 81 Mbps, QPSK
Power Supply					
Reference Voltage, VREF		3.2		V	
Quiescent Current (Total), ICQ		300		mA	

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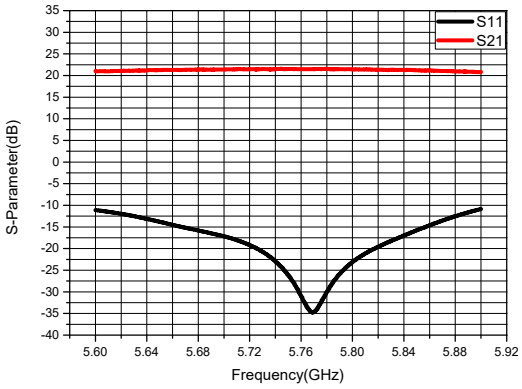
Typical Performance Data

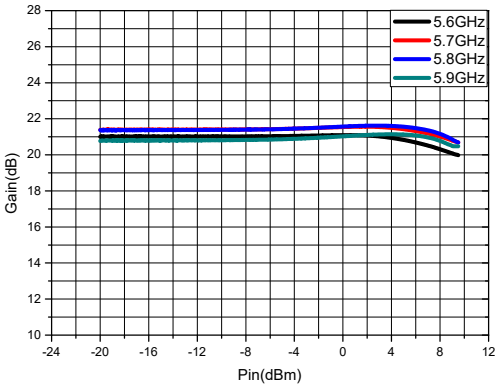
Test Frequency: 5.6 to 5.9GHz

(Test Condition: VCC1=VCC2=VCCB=5.5V, ICQ=240mA, T_{OP}=+25°C)

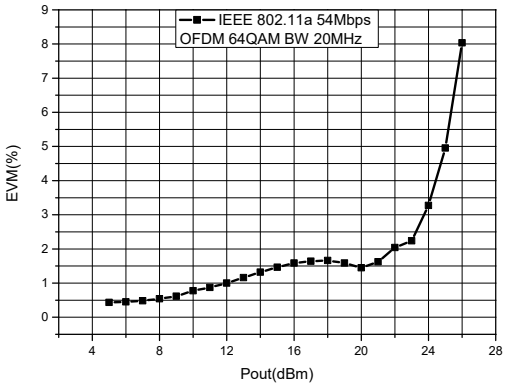
Small Signal Parameters



Power Gain vs. Input Power



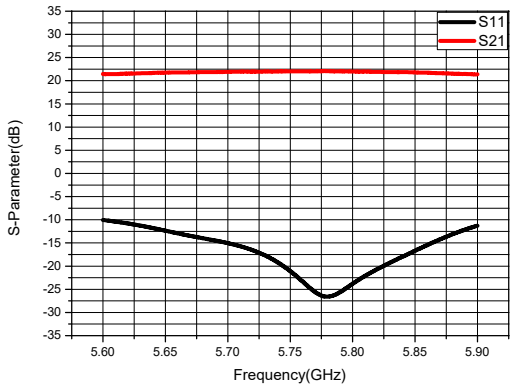
802.11a EVM vs. Output Power @5.8GHz



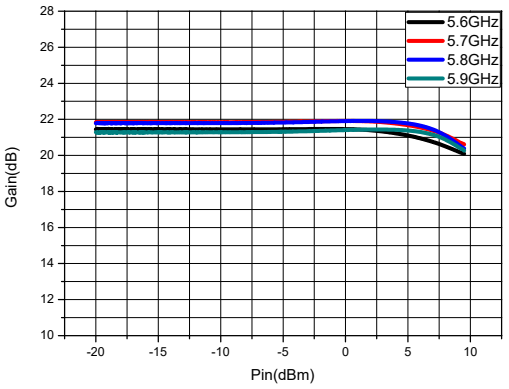
Test Frequency: 5.6 to 5.9GHz

(Test Condition: VCC1=VCC2=VCCB=5V, ICQ=240mA, TOP=+25°C)

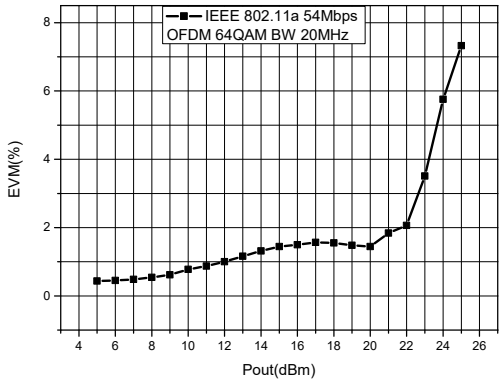
Small Signal Parameters



Power Gain vs. Input Power



802.11a EVM vs. Output Power @5.8GHz

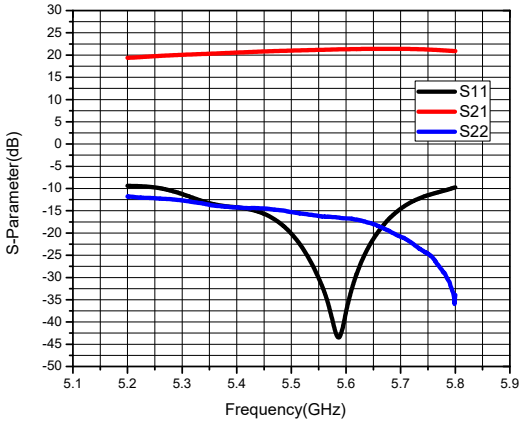


Typical Performance Data

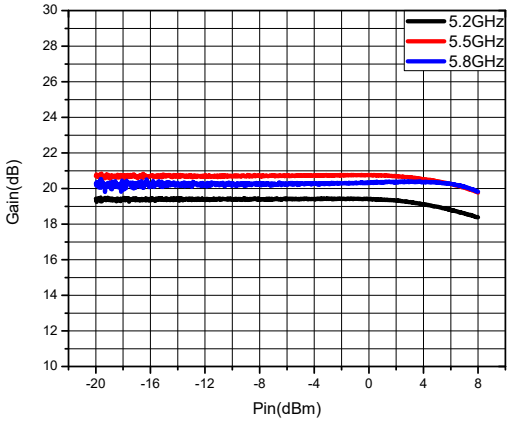
Test Frequency: 5.2 GHz to 5.8GHz

(Test Condition: VCC1=VCC2=VCCB=5.0V, ICQ=300mA, T_{OP}=+25°C)

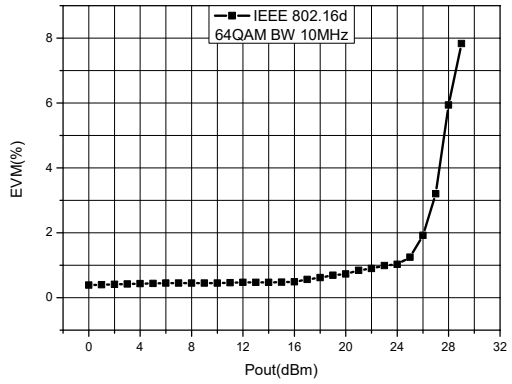
Small Signal Parameters



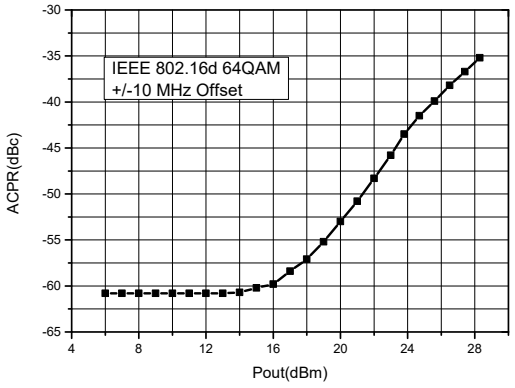
Power Gain vs. Input Power



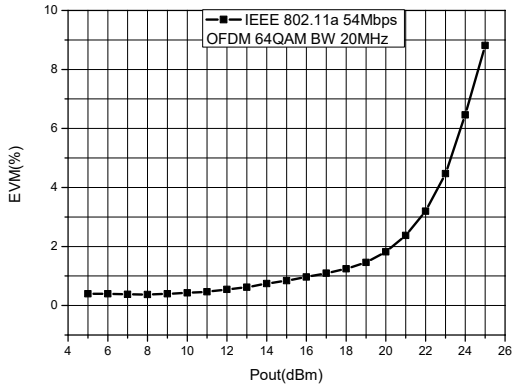
802.16d EVM vs. Output Power @5.5GHz



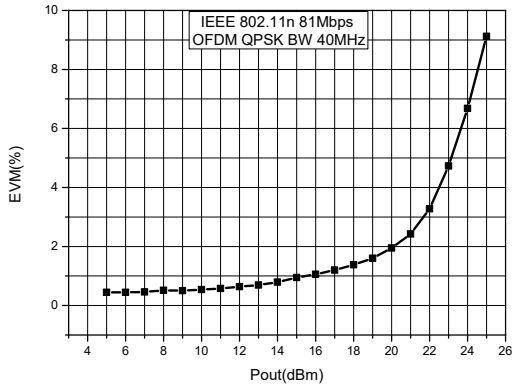
802.16d ACPR vs. Output Power @5.5GHz



802.11a EVM vs. Output Power @5.5GHz



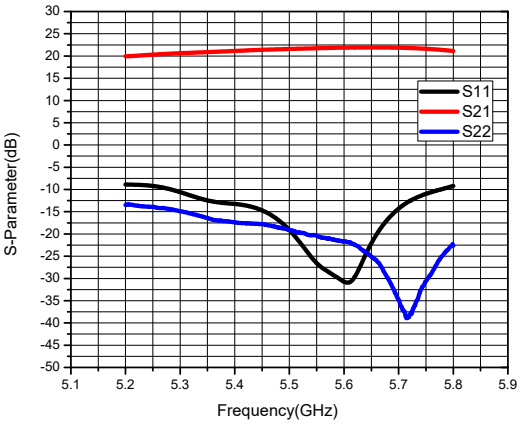
802.11n EVM vs. Output Power @5.5GHz



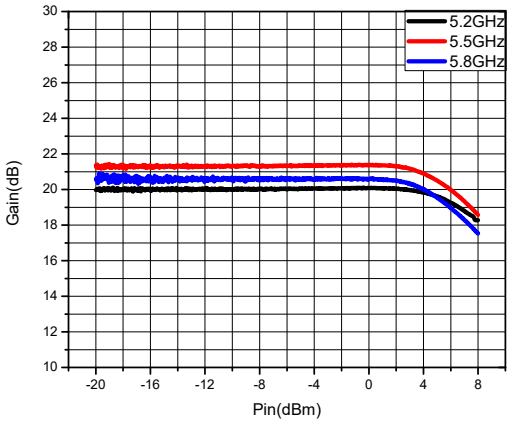
Test Frequency: 5.2 GHz to 5.8GHz

(Test Condition: VCC1=VCC2=VCCB=3.3V, ICQ=300mA, T_{OP}=+25°C)

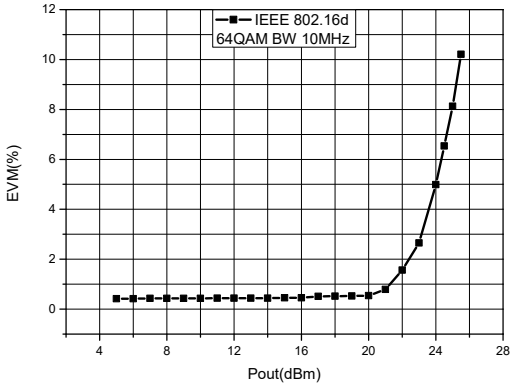
Small Signal Parameters



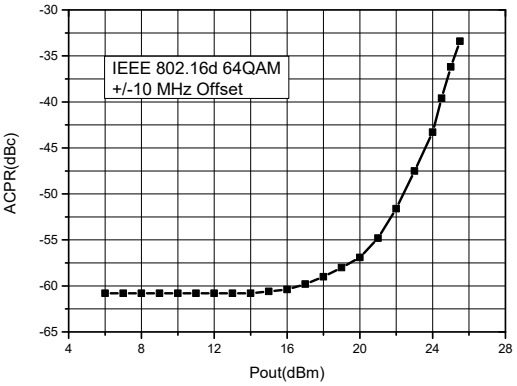
Power Gain vs. Input Power



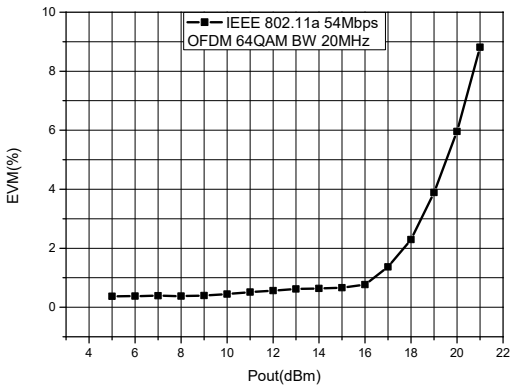
802.16d EVM vs. Output Power @5.5GHz



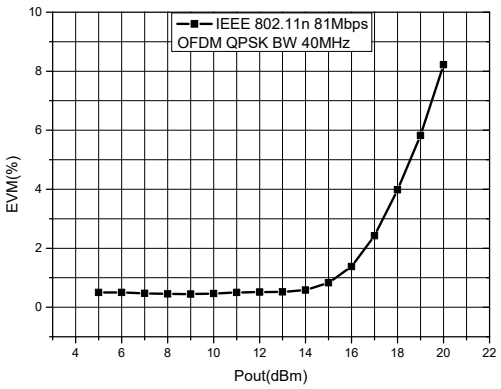
802.16d ACPR vs. Output Power @5.5GHz



802.11a EVM vs. Output Power @5.5GHz



802.11n EVM vs. Output Power @5.5GHz



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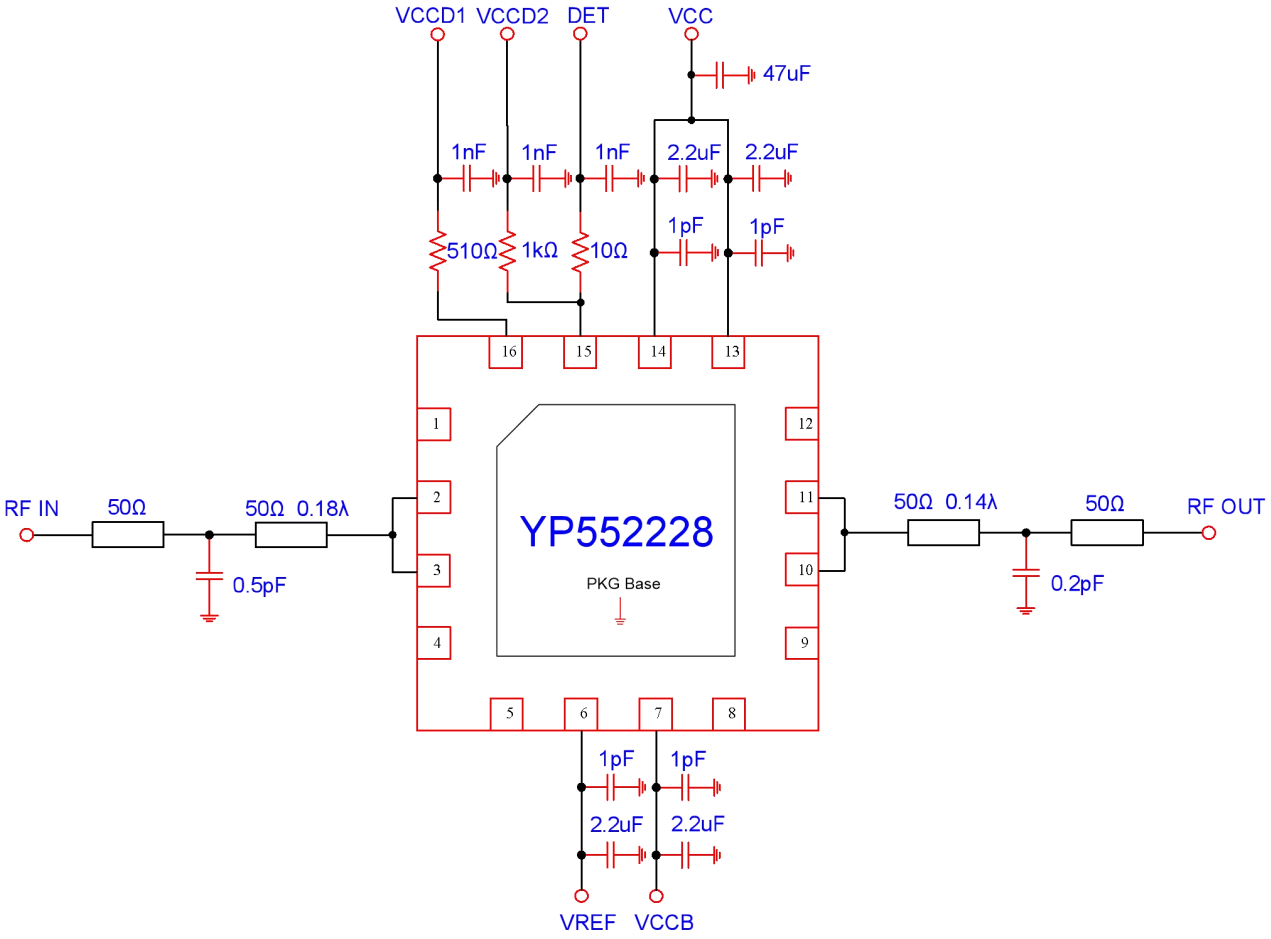
Evaluation Board Schematic

Test Frequency: 5.6 to 5.9GHz

(Supply & Reference Voltage Value refer to Table 1-1 &1-2)



Notes:

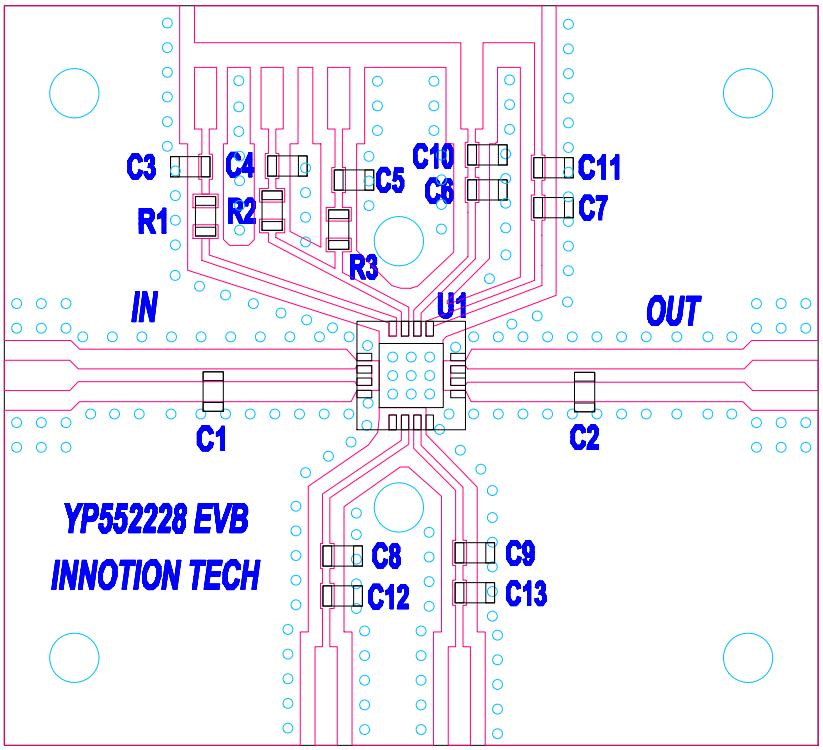
1. Pin15, 16 are active power detection circuit ports, if function is not desired, pin15, 16 may be connected to GND.

Evaluation Board Layout

Test Frequency: 5.6 to 5.9GHz

Board Size: 33mm×30mm

Board Thickness: 0.4 mm, Board Material: FR-4 (ε_r=4.5)



■ **Table 3: Circuit Component Designations and Values**

Component	Description	Manufacturer
C1	0.5pF Chip Capacitor	ATC
C2	0.2pF Chip Capacitor	ATC
C3,C4,C5	1nF Chip Capacitor	TDK
C6,C7,C8,C9	1pF Chip Capacitor	TDK
C10,C11,C12,C13	2.2uF Chip Capacitor	TDK
R1	510Ω Chip Resistor	YAGEO
R2	1kΩ Chip Resistor	YAGEO
R3	10Ω Chip Resistor	YAGEO
U1	YP552228	INNOTION

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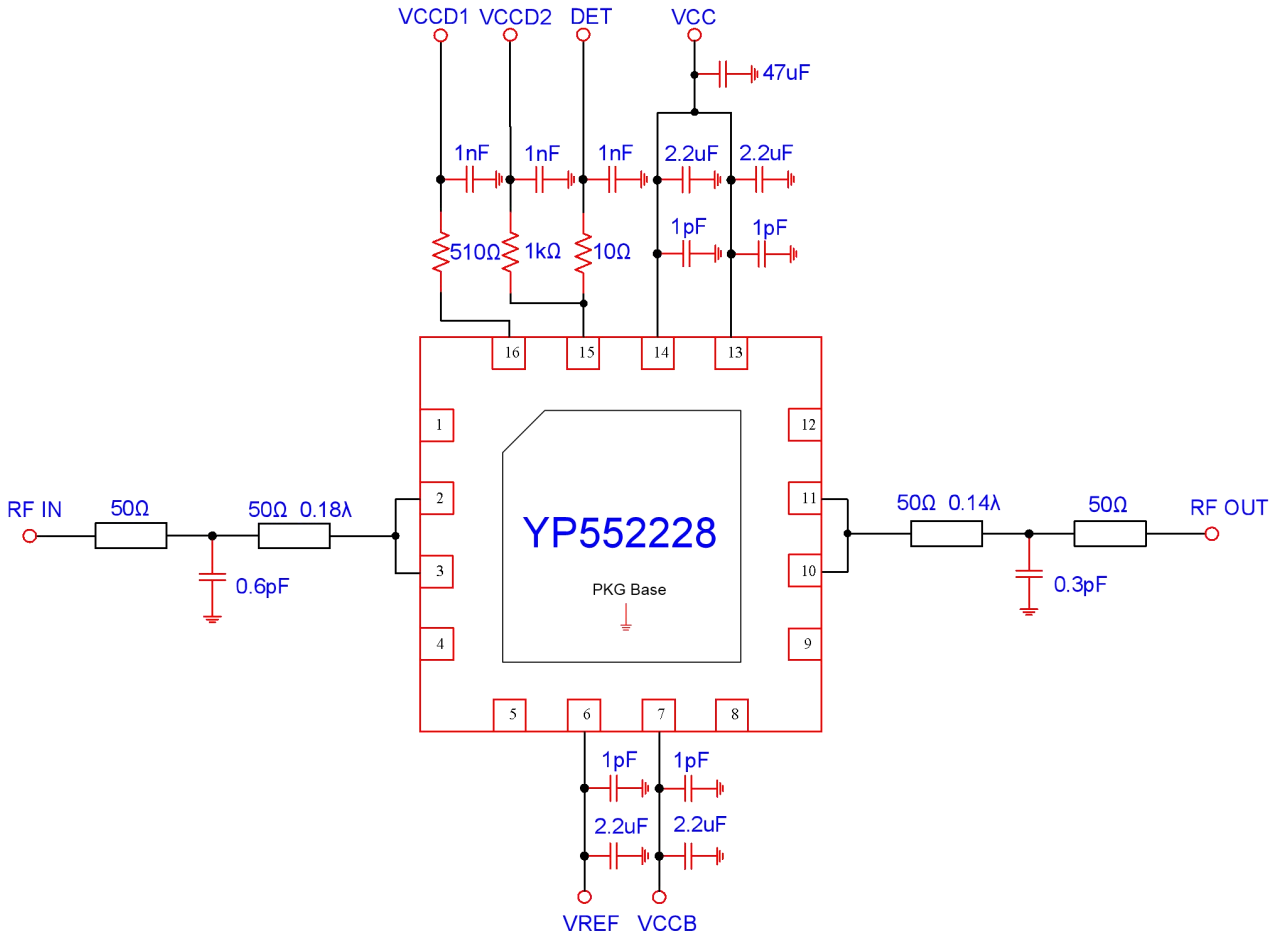
Evaluation Board Schematic

Test Frequency: 5.2 to 5.8GHz

(Supply & Reference Voltage Value refer to Table 2-1 &2-2)



Notes:

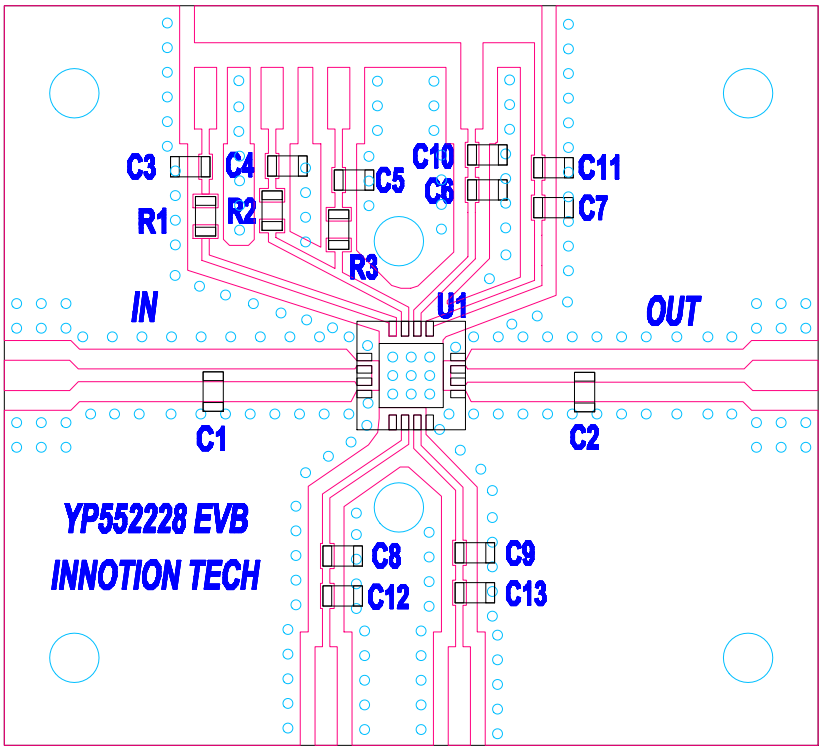
1. Pin15, 16 are active power detection circuit ports, if function is not desired, pin16, 16 may be connected to GND.

Evaluation Board Layout

Test Frequency: 5.2 to 5.8GHz

Board Size: 33mm×30mm

Board Thickness: 0.4mm, Board Material: FR-4 (ε_r=4.5)



■ **Table 4: Circuit Component Designations and Values**

Component	Description	Manufacturer
C1	0.6pF Chip Capacitor	ATC
C2	0.3pF Chip Capacitor	ATC
C3,C4,C5	1nF Chip Capacitor	TDK
C6,C7,C8,C9	1pF Chip Capacitor	TDK
C10,C11,C12,C13	2.2uF Chip Capacitor	TDK
R1	510Ω Chip Resistor	YAGEO
R2	1kΩ Chip Resistor	YAGEO
R3	10Ω Chip Resistor	YAGEO
U1	YP552228	INNOTION

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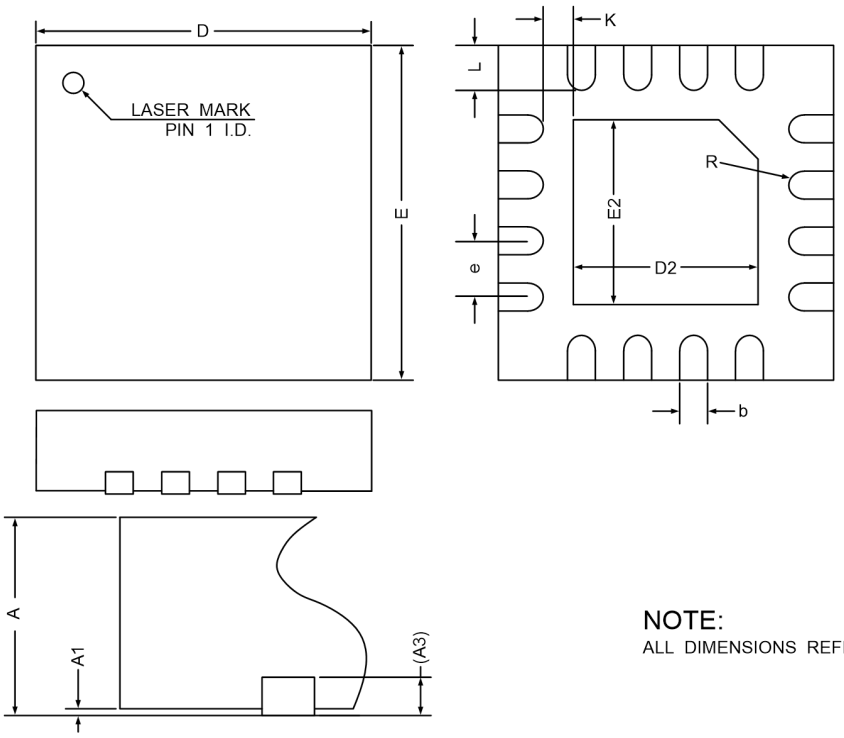
Packaging Diagram



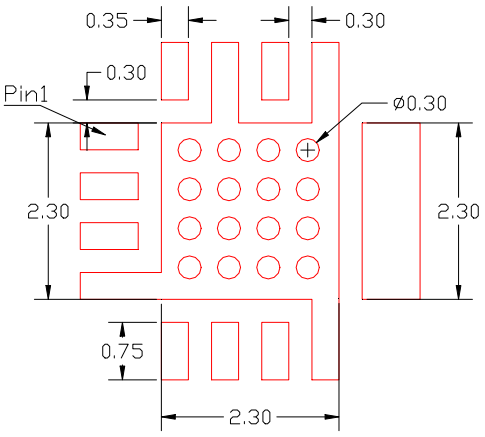
COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
A3		0.203 REF	
b	0.25	0.30	0.35
D	3.95	4.00	4.05
E	3.95	4.00	4.05
D2	2.00	2.15	2.25
E2	2.00	2.15	2.25
e	0.60	0.65	0.70
K	0.375	—	—
L	0.35	0.40	0.45
R	0.09	—	—

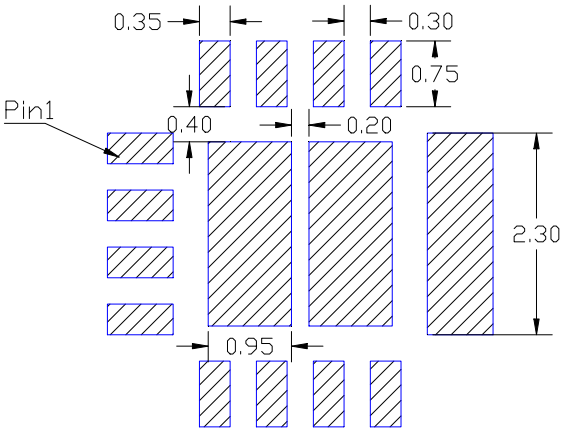
NOTE:
ALL DIMENSIONS REFER TO JEDEC STANDARD MO-220 WEED-4.

PCB Land Pattern and Stencil Outline

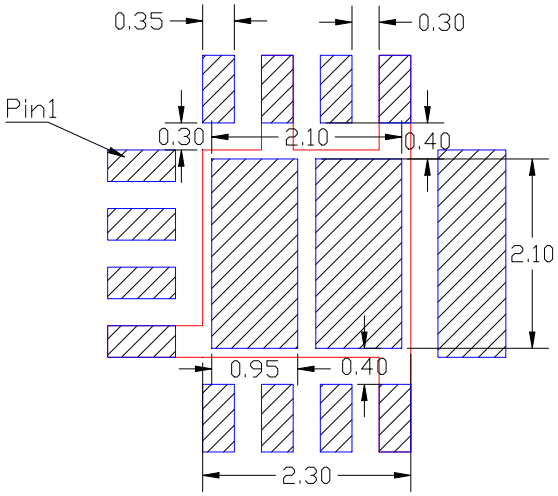
(Units: millimeters)



PCB Land Pattern (Top View)

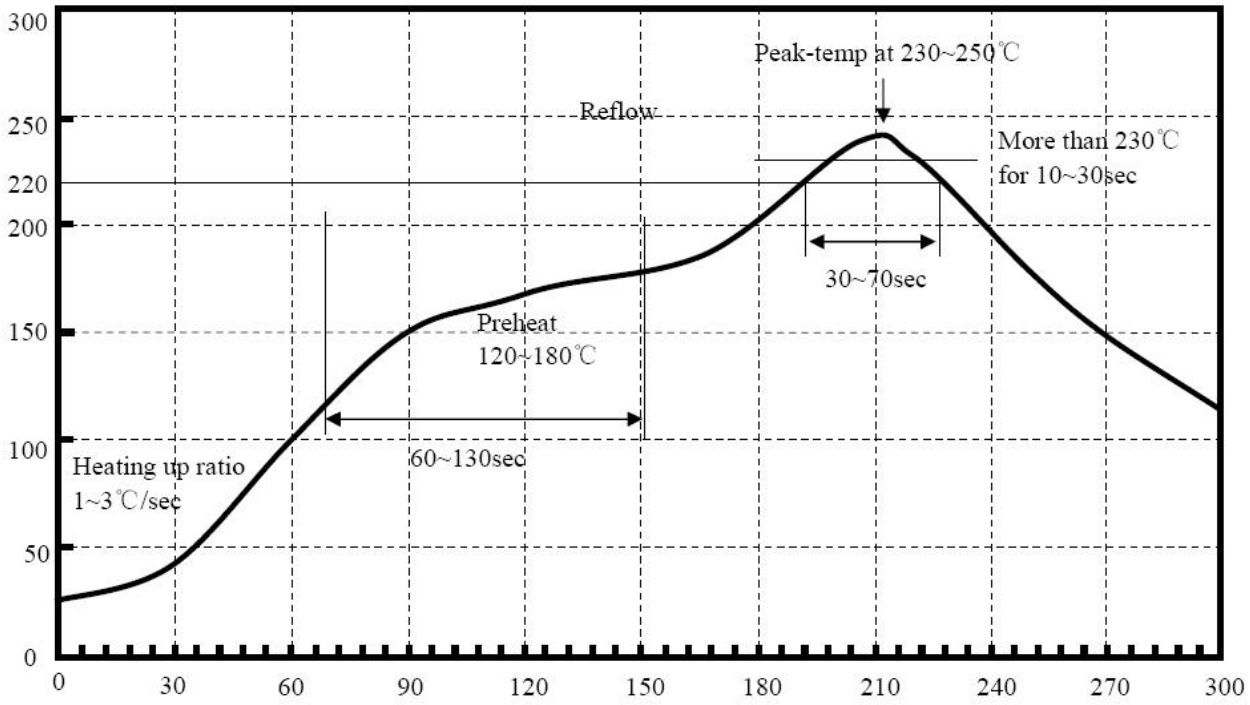


Stencil Outline



Combined PCB Land Pattern and Stencil Outline

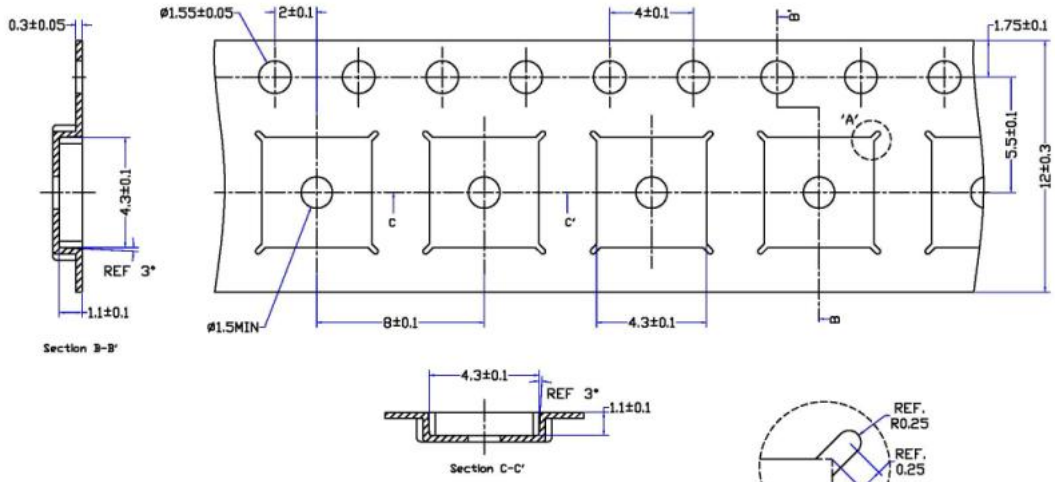
Recommended Solder Temperature



Recommended Temperature

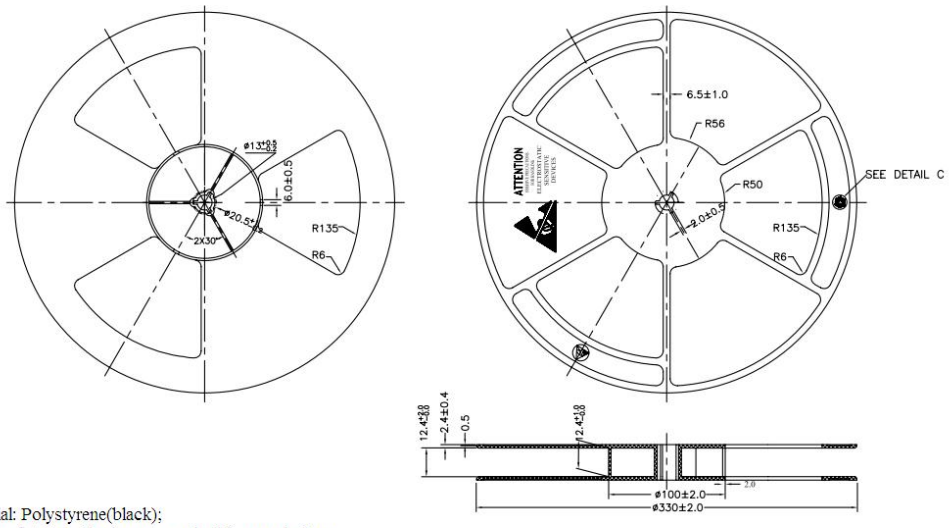
Sn95.5Ag4.0Cu0.5

Tape dimensions and Orientation



NOTES:
1.10 procket hole pitch cumulative tolerance ±0.2
2.Carrier camber is within 1mm in 100mm
3.MATERIAL:CONDUCTIVE POYSTYRENE
4.ALL DIMS IN MM
5.There must not be foreign body adhesion and the state of the surface must be excellent
6.17" PAPER—Reel, 51875pockets
7.Surface resistance 1X10E11(max) OHMS/SQ

Reel dimensions and Orientation



Notes:
1. Material: Polystyrene(black);
2. Surface flatness: Maximum permissible error is 3mm;
3. Dimensions in millimeters;
4. Surface resistance: 105TO 1010/OHMS/SQ;
5. General tolerances: ±0.25