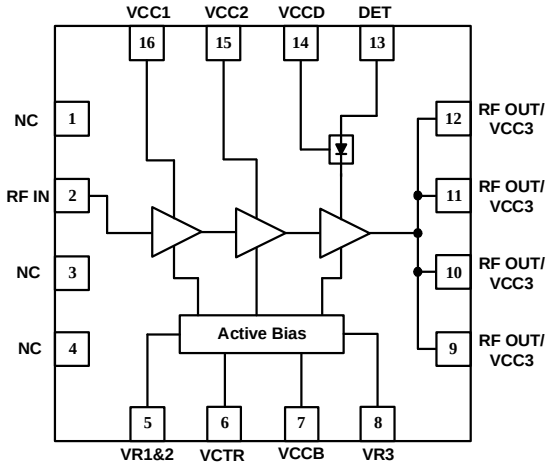
RoHS & Pb-Free Product

Features

- 200~1000MHz Frequency Range
- 3.3V~5.0V Operation
- 32dB Gain
- 36dBm P1dB @VCC=5V
- 250mA Quiescent Current
- >20dB Input Return Loss
- Integrated Output Power Detector



Functional Block Diagram

Applications

- Wireless data communication
- CDMA /GSM
- ISM
- RFID
- CMMB
- TETRA

Product Description

The AC3236W is a three-stage high-gain power amplifier optimized for the applications in bands from 200MHz to 1000MHz. The device is manufactured on an advanced InGaP/GaAs Heterojunction Bipolar Transistor (HBT) process. This amplifier provides a typical gain of 32dB and P1dB power of 36 dBm, typical bias condition is 5.0V at 250 mA. The input are internally matched to 50Ω and the output require a minimum of external matching components to cover the entire 200MHz to 1000MHz. The AC3236W is assembled in a 16-pin, 4×4mm^2, QFN package. It is internally integrated with ESD protection unit.

Ordering Information

- AC3236W 200MHz to 1000MHz 4W Power Amplifier
- AC3236W-EVB 400MHz~470MHz, 600MHz~800MHz, 820MHz~850MHz, 860MHz~960MHz Evaluation PCB

Pin Description

Pin No.	Symbol	Description
1, 3, 4	NC	No internal connection. May be connected to ground.
2	RF IN	RF input
5/8	VR1&2/ VR3	Bias current control voltage for the 1st&2ndStage/3rd Stage
6	VCTR	Power on/off control voltage, Apply >1.5V_{DC} to power down the three power amplifier stages. Apply 0V_{DC} to power up. If function is not desired, pin6 may be connected to GND.
7	VCCB	Supply voltage for bias circuit
13	DET	Power detector provides and output voltage proportional to the RF level VCC3/RF OUT. If function is not desired, pin13,14 may be left unterminated.
14	VCCD	Supply voltage for power detector
9, 10, 11, 12	RF OUT/ VCC3	RF output/VCC3
15/16	VCC2/VCC1	Collector Supply voltage for the 2nd / 1st stage

Absolute Maximum Ratings

Parameter	Rating	Unit
Input RF Power with 50Ω Output Load	+15	dBm
Supply Voltage	-0.5 to +8.0	V
Bias Voltage	-0.5 to +3.5	V
DC Supply Current	2000	mA
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-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 Characteristics

Table 1: For Wireless data communication Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC=5.0V, ICC=250mA, Temp=+25°C, Freq=420MHz to 470MHz
Frequency Range	420	433	470	MHz	
Output Power@P1dB		36.5		dBm	VCC=5.0V@433MHz
Gain	31	31.6	32	dB	VCC=5.0V@433MHz
Power Supply					
Operating Voltage		5.0		V	
Reference Voltage 1-2		2.6		V	
Reference Voltage 3		2.6		V	
Quiescent Current (Total)		250		mA	

Table 2: For CMMB Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC=5.0V, ICC=370mA, Temp=+25°C, Freq=600MHz to 800MHz
Frequency Range	600	700	800	MHz	
Output Power		36		dBm	VCC=5.0V, ICC=370mA@700MHz
Gain		32		dB	VCC=5.0V, ICC=370mA@700MHz
Output IP3		50.8		dBm	Pout=29dBm@700MHz

Table 3: For CDMA Tx Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC =5.0V, ICC=300mA, Temp=+25°C, Freq=870MHz to 900MHz
Frequency Range	870	880	900	MHz	
Output Power		36.5		dBm	VCC=5.0V, ICC=300mA@880MHz
Gain		32		dB	VCC=5.0V, ICC=300mA@880MHz
Output IP3		50		dBm	Pout=29dBm@880MHz

Table 4: For RFID Application

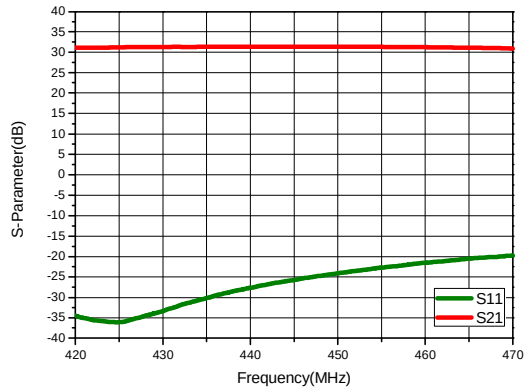
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC =5.0V, ICC=300mA, Temp=+25°C, Freq=900MHz to 930MHz
Frequency Range	900	915	930	MHz	
Output Power		36.5		dBm	VCC=5.0V, ICC=300mA@915MHz
Gain		31.5		dB	VCC=5.0V, ICC=300mA@915MHz
Output IP3		48		dBm	Pout=30dBm@915MHz

Table 5: For GSM Tx Application

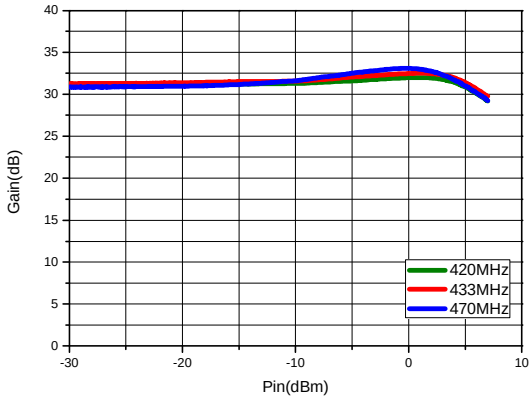
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC =5.0V, ICC=370mA, Temp=+25°C, Freq=935MHz to 960MHz
Frequency Range	935	950	960	MHz	
Output Power		36.5		dBm	VCC=5.0V, ICC=370mA@950MHz
Gain		31.5		dB	VCC=5.0V, ICC=370mA@950MHz
Output IP3		48.5		dBm	Pout=30dBm@950MHz

Typical Performance Data (Frequency range: 420MHz~470MHz)

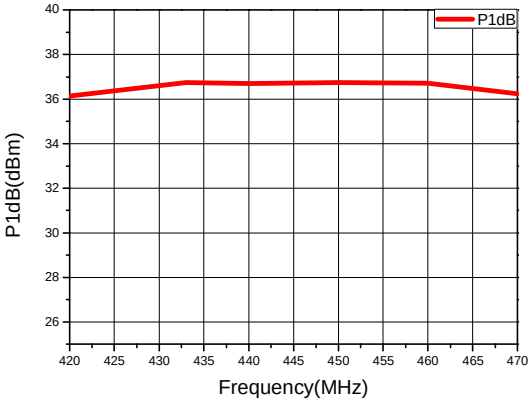
Small Signal Parameters



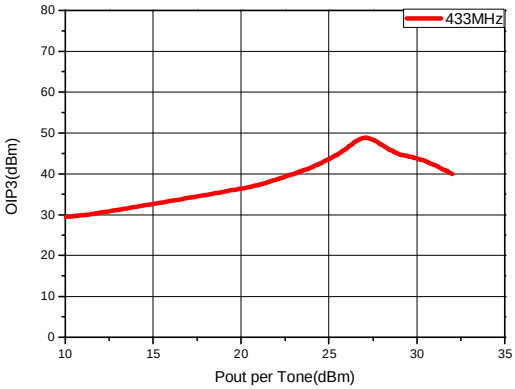
Gain vs. Input Power



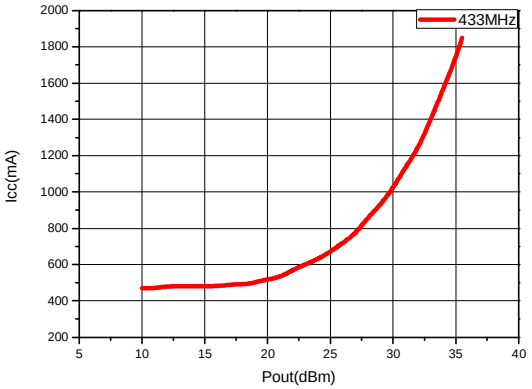
P1dB vs. Frequency



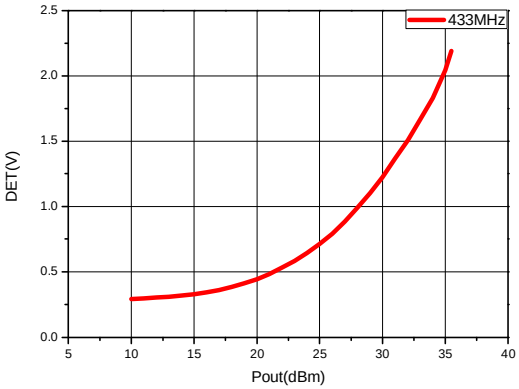
Output IP3 vs. Tone Power@433MHz



ICC vs. Output Power



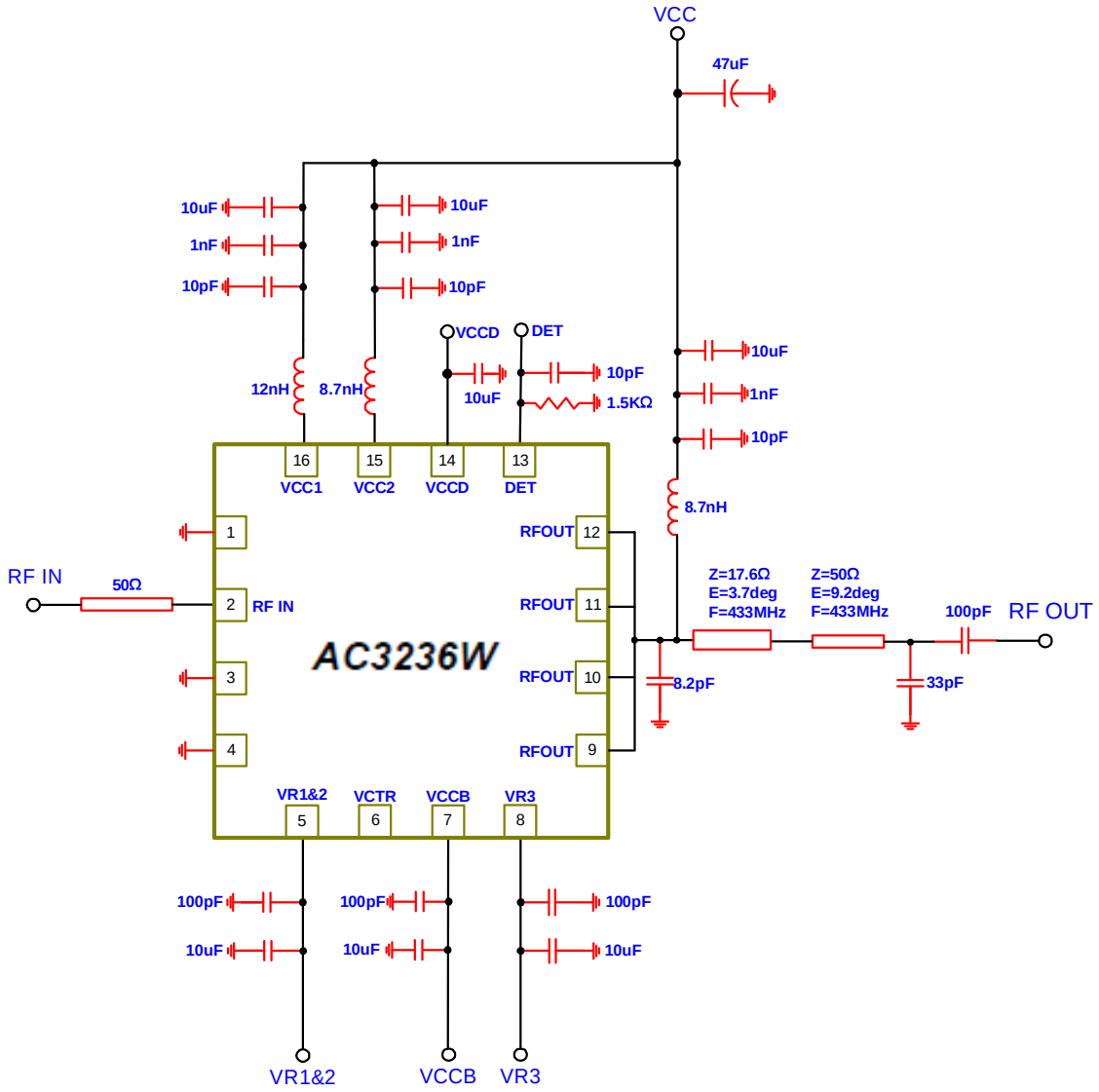
DET vs. Output Power



Application circuit: Wireless Data Communication (Frequency range: 420MHz~470MHz)

(Test Condition: VCC=VCCB=5.0V, VR1&2=VR3=2.6V, ICC=250mA, T=25°C)

Application Schematic



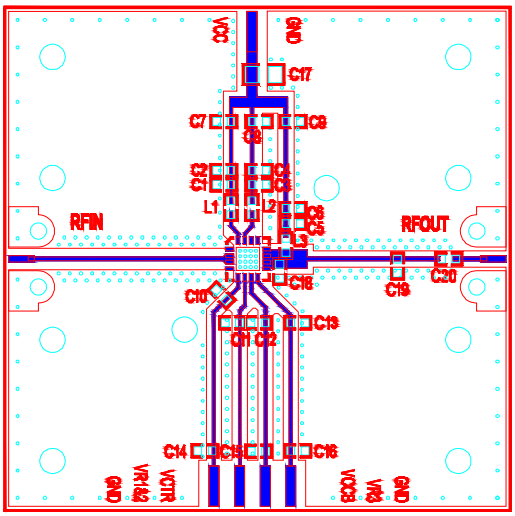
Notes:

1. Pin6 is power down pin. Apply >1.5 V_{DC} to power down the three power amplifier stages. Apply 0V_{DC} to power up. If function is not desired, pin6 may be connected to GND.
2. Pin13, 14 are active power detection circuit ports, if function is not desired, pin13, 14 may be left unterminated（open）.

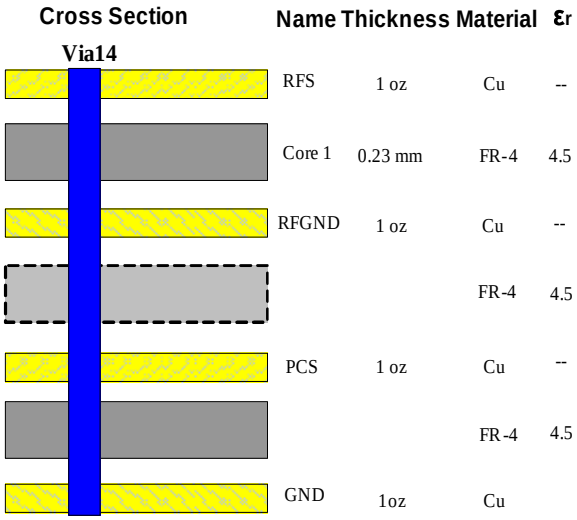
Evaluation Board Layout: (Frequency range: 420MHz~450MHz)

Board Size 50mm×50mm, Board Thickness 1mm, Board Material FR-4 (ε_r=4.5)

Evaluation Board Top View



Layer Detail Physical Characteristics

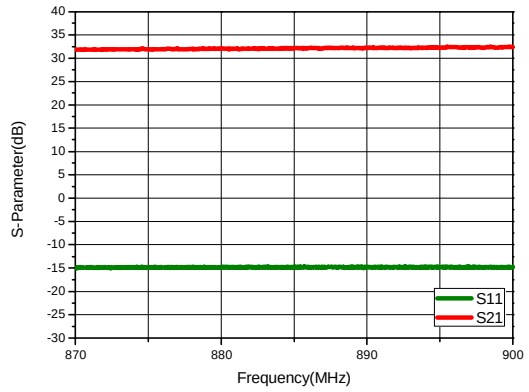


■ **Table 6: Circuit Component Designations and Values**

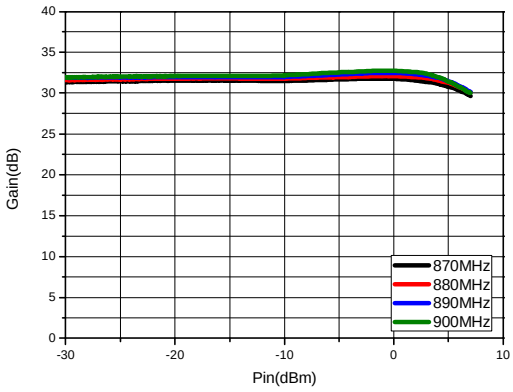
Component	Value	Manufacturer
C1、C3、C5	10pF	TDK Chip Capacitors
C10、C11、C12、C13、C20	100pF	TDK Chip Capacitors
C2、C4、C6	1nF	TDK Chip Capacitors
C7、C8、C9、C14、C15 、C16	10μF	TDK Chip Capacitors
C17	47μF	AVX
C18	8.2pF	DLC Chip Capacitor
C19	33pF	DLC Chip Capacitor
L1	12nH	ATC Inductor
L2、L3	8.7nH	ATC Inductor

Typical Performance Data (Frequency range: 870MHz~900MHz)

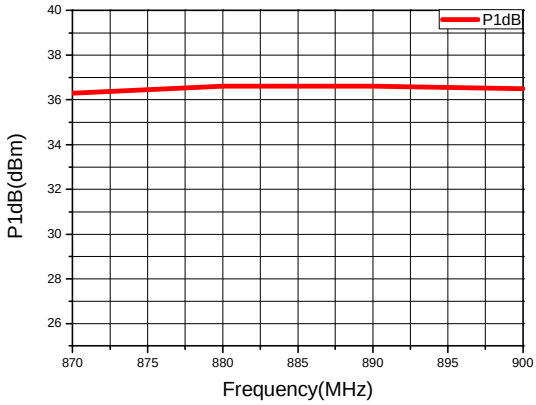
Small Signal Parameters



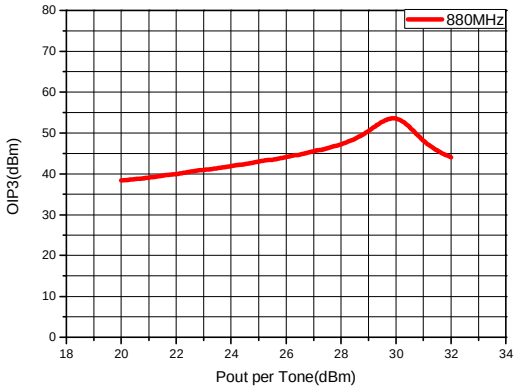
Gain vs. Input Power



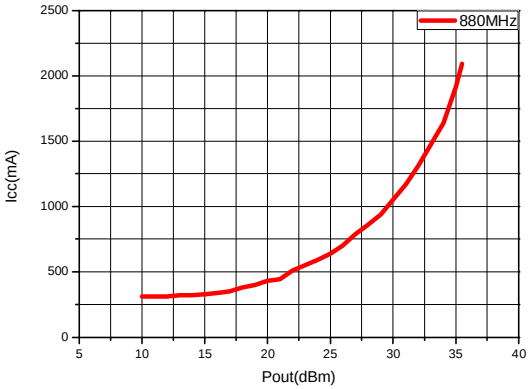
P1dB vs. Frequency



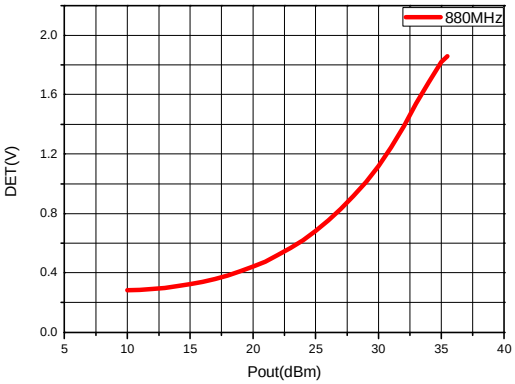
Output IP3 vs. Tone Power@880MHz



ICC vs. Output Power



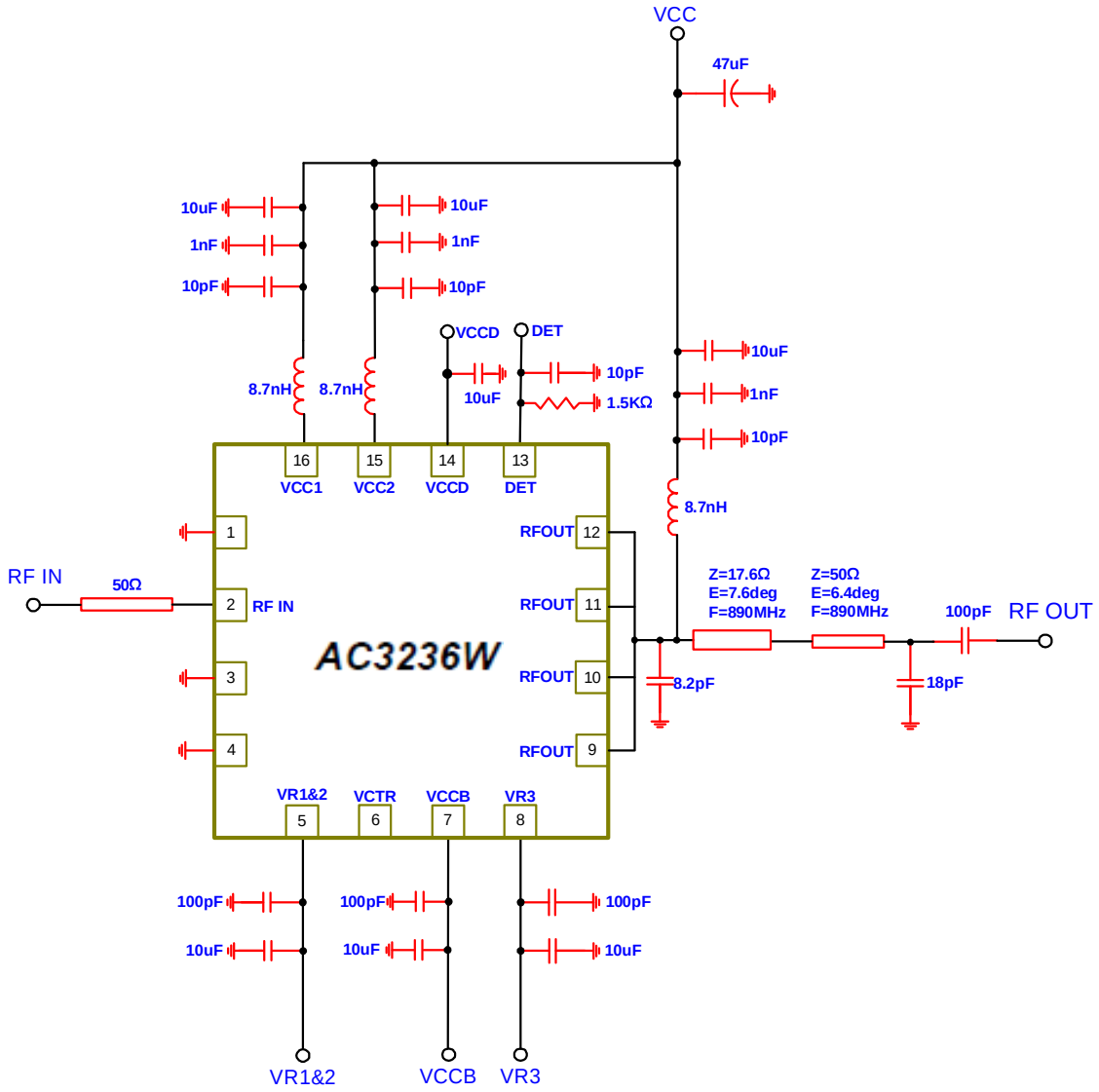
DET vs. Output Power



Application circuit: CDMA Tx (Frequency range: 870MHz~900MHz)

(Test Condition: VCC=VCCB=5.0V, VR1&2=VR3=2.65V, ICC=300mA, T=25°C)

Application Schematic



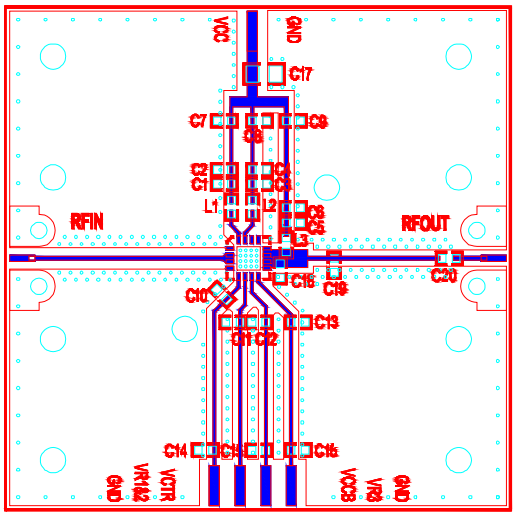
Notes:

1. Pin6 is power down pin. Apply >1.5 V_{DC} to power down the three power amplifier stages. Apply 0V_{DC} to power up. If function is not desired, pin6 may be connected to GND.
2. Pin13, 14 are active power detection circuit ports, if function is not desired, pin13, 14 may be left unterminated (open).

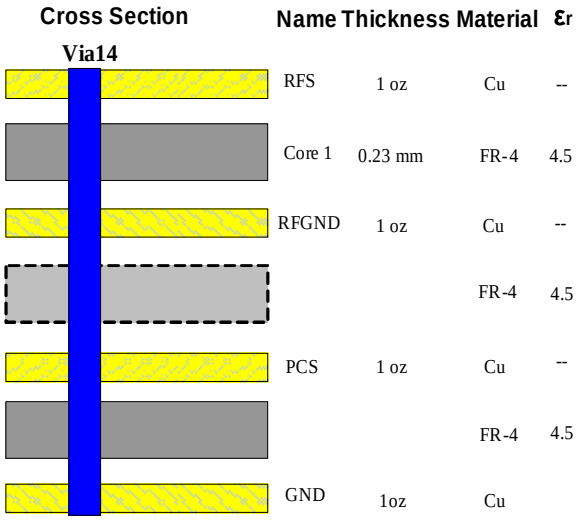
Evaluation Board Layout: (Frequency range: 870MHz~900MHz)

Board Size 50mm×50mm, Board Thickness 1mm, Board Material FR-4 (ε_r=4.5)

Evaluation Board Top View



Layer Detail Physical Characteristics

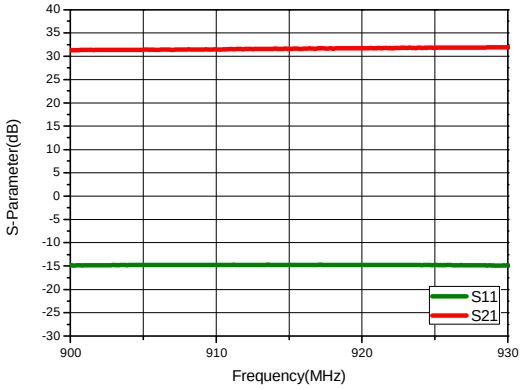


■ **Table 7: Circuit Component Designations and Values**

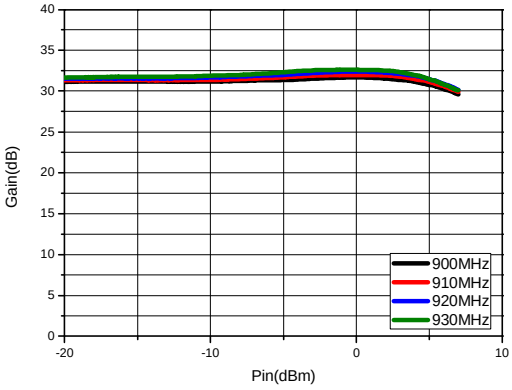
Component	Value	Manufacturer
C1、C3、C5	10pF	TDK Chip Capacitors
C10、C11、C12、C13、C20	100pF	TDK Chip Capacitors
C2、C4、C6	1nF	TDK Chip Capacitors
C7、C8、C9、C14、C15 、C16	10μF	TDK Chip Capacitors
C17	47μF	AVX
C18	8.2pF	DLC Chip Capacitor
C19	18pF	DLC Chip Capacitor
L1、 L2、L3	8.7nH	ATC Inductor

Typical Performance Data (Frequency range: 900MHz~930MHz)

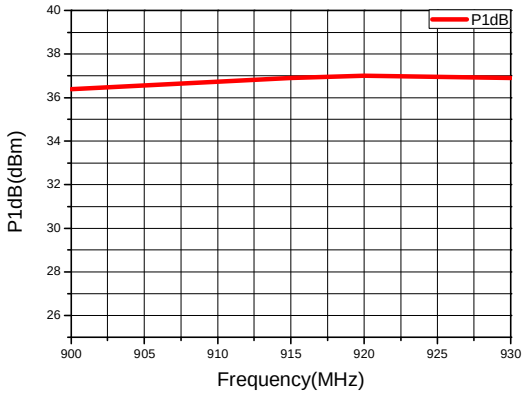
Small Signal Parameters



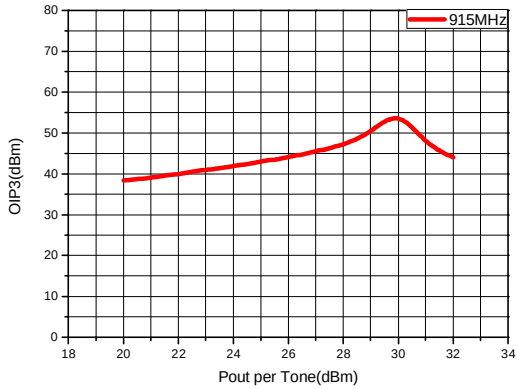
Gain vs. Input Power



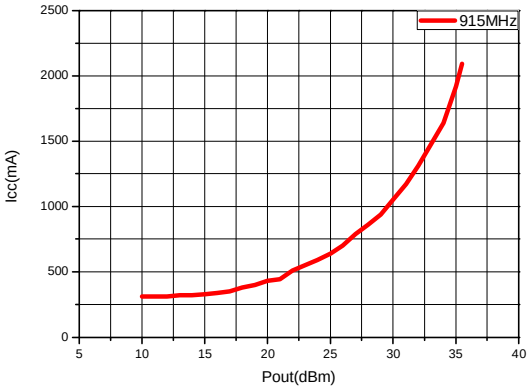
P1dB vs. Frequency



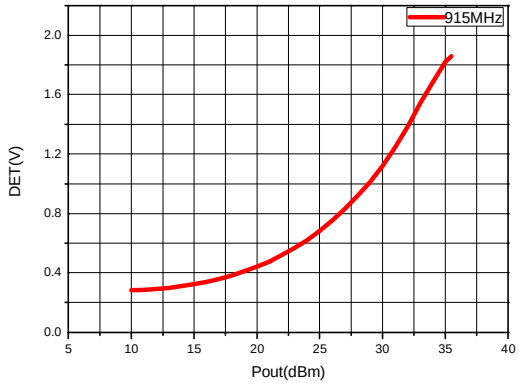
Output IP3 vs. Tone Power@915MHz



ICC vs. Output Power



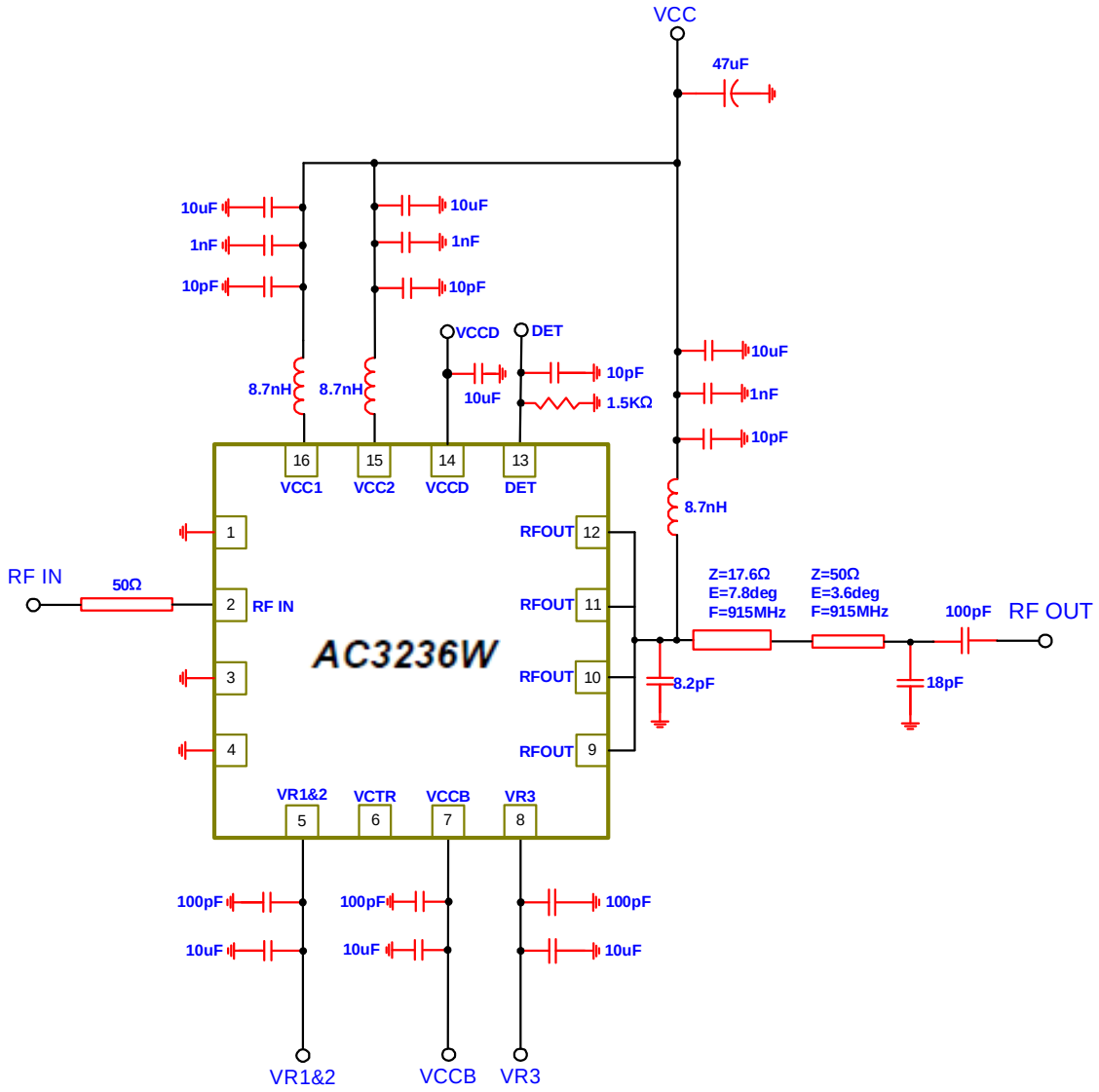
DET vs. Output Power



Application circuit: RFID (Frequency range: 900MHz~930MHz)

(Test Condition: VCC=VCCB=5.0V, VR1&2=VR3=2.65V, ICC=300mA, T=25°C)

Application Schematic



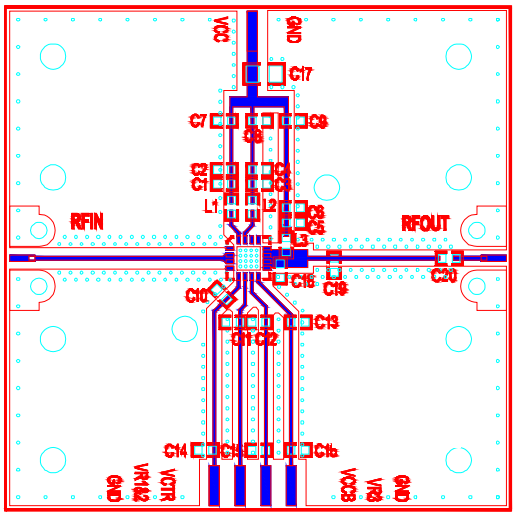
Notes:

1. Pin6 is power down pin. Apply >1.5 V_{DC} to power down the three power amplifier stages. Apply 0V_{DC} to power up. If function is not desired, pin6 may be connected to GND.
2. Pin13, 14 are active power detection circuit ports, if function is not desired, pin13, 14 may be left unterminated (open).

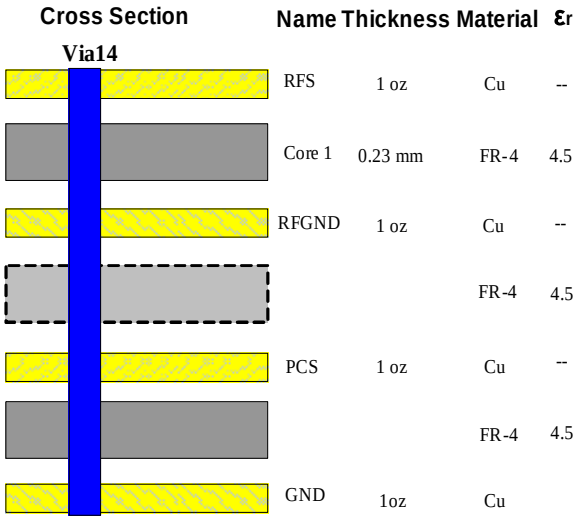
Evaluation Board Layout: (Frequency range: 900MHz~930MHz)

Board Size 50mm×50mm, Board Thickness 1mm, Board Material FR-4 (ε_r=4.5)

Evaluation Board Top View



Layer Detail Physical Characteristics



■ **Table 8: Circuit Component Designations and Values**

Component	Value	Manufacturer
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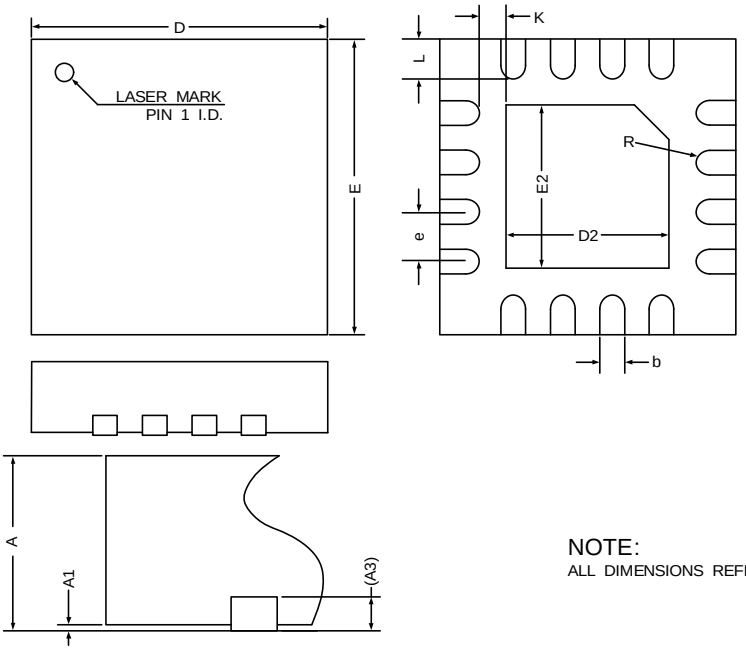
C7、C8、C9、C14、C15 、C16	10μF	TDK Chip Capacitors
C17	47μF	AVX
C18	8.2pF	DLC Chip Capacitor
C19	18pF	DLC Chip Capacitor
L1、L2、L3	8.7nH	ATC Inductor

Packaging Diagram



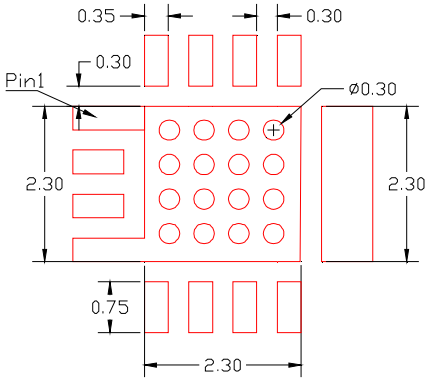
COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

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	—	—

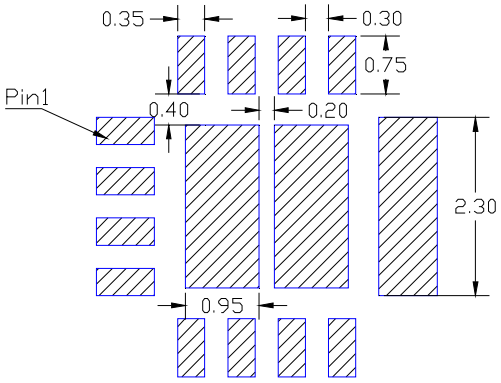
NOTE:
ALL DIMENSIONS REFER TO JEDEC STANDARD MO-220 WEED-4.

PCB Land Pattern and Stencil Outline

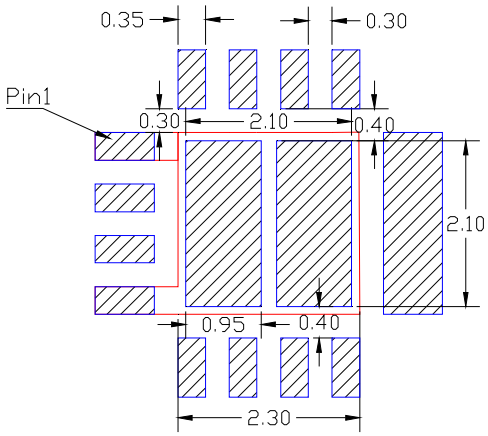
(Units: millimeters)



PCB Land Pattern (Top View)

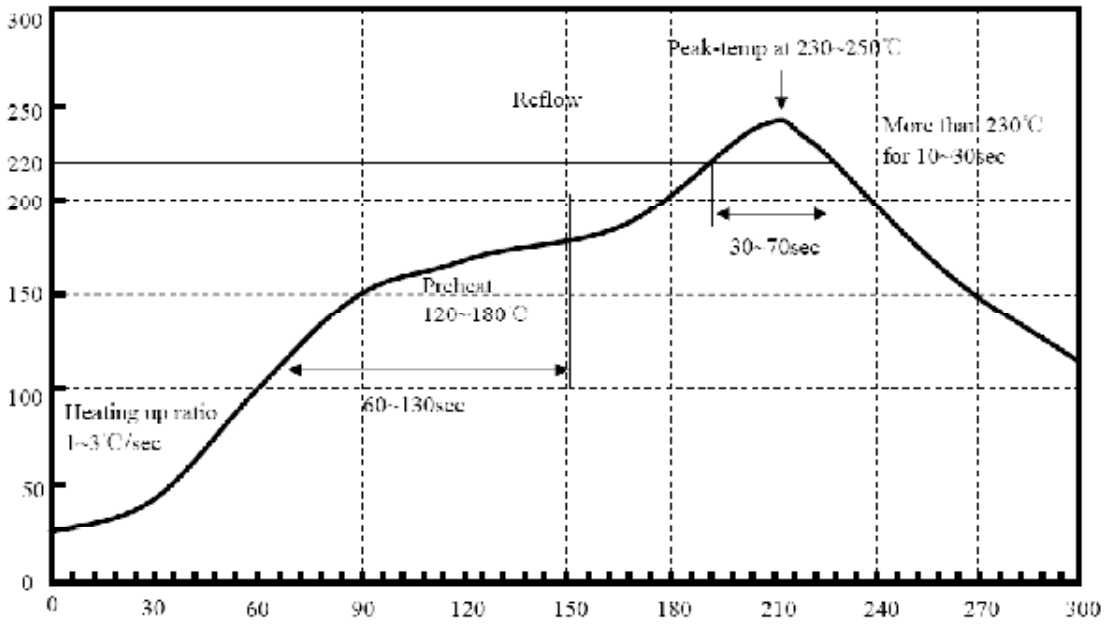


Stencil Outline



Combined PCB Land Pattern and Stencil Outline

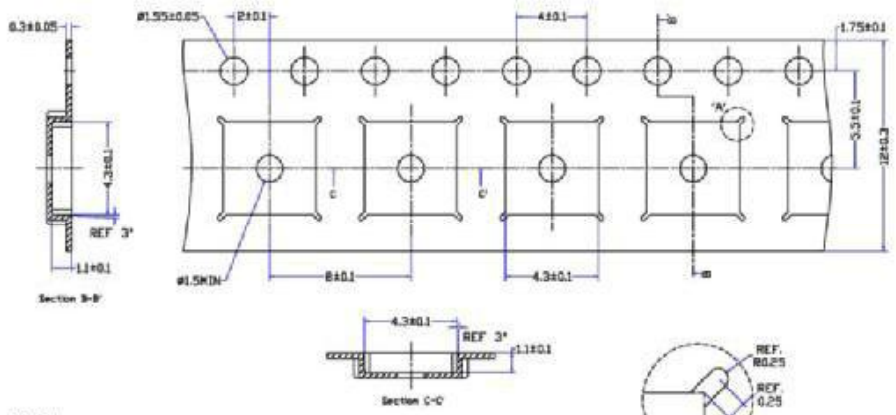
Recommended Solder Temperature



Recommended Temperature

Sn95.5Ag4.0Cu0.5

Tape dimensions and Orientation



Reel dimensions and Orientation