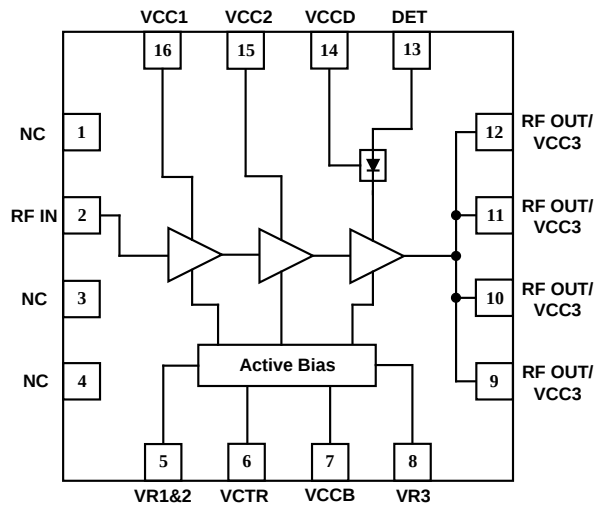


Features

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



Functional Block Diagram

Applications

- Wireless data communication
- CDMA
- GSM
- RFID
- CMMB
- TETRA
- LoRa

Product Description

The YP3236W is a three-stage high-gain power amplifier optimized for the applications in bands from 200MHz to 1000MHz. It needs different matching circuit for different frequency range. 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 is internally matched to 50Ω and the output require a minimum of external matching components to cover the entire 200MHz to 1000MHz. The YP3236W is assembled in a 16-pin, 4×4mm², QFN package. It is internally integrated with ESD protection unit.

Ordering Information

- YP3236W 200MHz to 1000MHz 4W Power Amplifier
- YP3236W-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 1 st & 2 nd Stage, 3 rd Stage
6	VCTR	Power on/off control voltage. Apply >2.5VDC to power down the three power amplifier stages. Apply 0VDC 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/ Supply voltage for 3 rd stage
15, 16	VCC2, VCC1	Supply voltage for the 2 nd , 1 st stage
PKG Base	GND	Ground connection

Absolute Maximum Ratings


Caution! ESD sensitive device.

Parameter	Symbol	Rating	Unit
Input RF Power with 50Ω Output Load	RF IN	+8	dBm
Supply Voltage	VCC1,VCC2,VCC3, VCCB,VCCD	-0.5 to +8.0	V
Reference Voltage	VR1&2, VR3	-0.5 to +3.5	V
Operating Ambient Temperature	T _{OP}	-40 to +85	°C
Storage Temperature	T _{ST}	-40 to +150	°C

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

(VCC1=VCC2=VCC3=VCCB=5.0V, T_{OP}=+25°C as measured on the evaluation board, unless otherwise noted)

Table 1: For Wireless data communication Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					Freq=420MHz to 470MHz VR1&2= VR3=+2.6V
Frequency Range	420	433	470	MHz	
Output Power @P1dB		36.5		dBm	@433MHz
Gain, S ₂₁	31	31.6	32	dB	@433MHz
Quiescent Current, ICQ		250		mA	

Table 2: For CMMB Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					Freq=600MHz to 800MHz ICQ=370mA
Frequency Range	600	700	800	MHz	
Output Power		36		dBm	@700MHz
Gain, S ₂₁		32		dB	@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					Freq=870MHz to 900MHz ICQ=300mA
Frequency Range	870	880	900	MHz	
Output Power		36.5		dBm	@880MHz
Gain, S ₂₁		32		dB	@880MHz
Output IP3		50		dBm	@Pout=29dBm, 880MHz

Table 4: For RFID Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					Freq=900MHz to 930MHz ICQ=300mA
Frequency Range	900	915	930	MHz	
Output Power		36.5		dBm	@915MHz
Gain, S ₂₁		31.5		dB	@915MHz
Output IP3		48		dBm	@Pout=30dBm, 915MHz

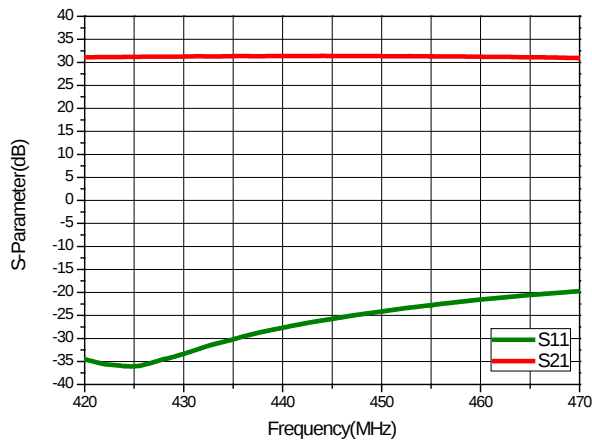
Table 5: For GSM Tx Application

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					Freq=935MHz to 960MHz ICQ=370mA
Frequency Range	935	950	960	MHz	
Output Power		36.5		dBm	@950MHz
Gain, S ₂₁		31.5		dB	@950MHz
Output IP3		48.5		dBm	@Pout=30dBm, 950MHz

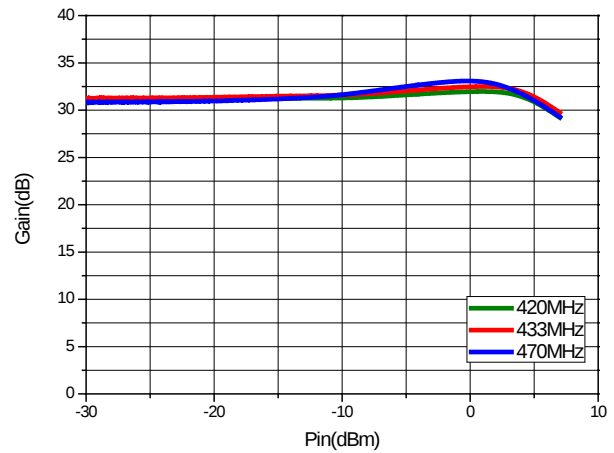
Typical Performance Data 01

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

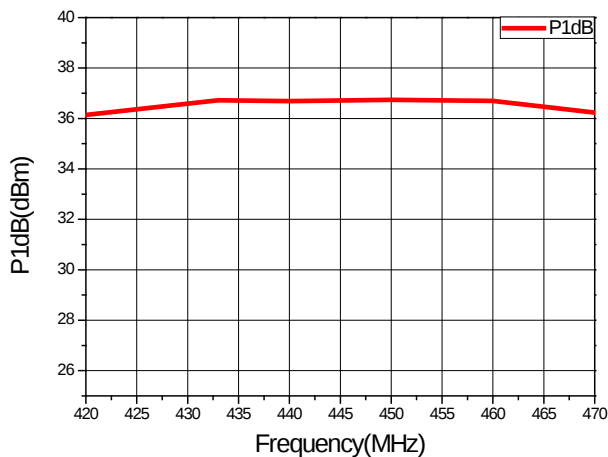
Small Signal Parameters



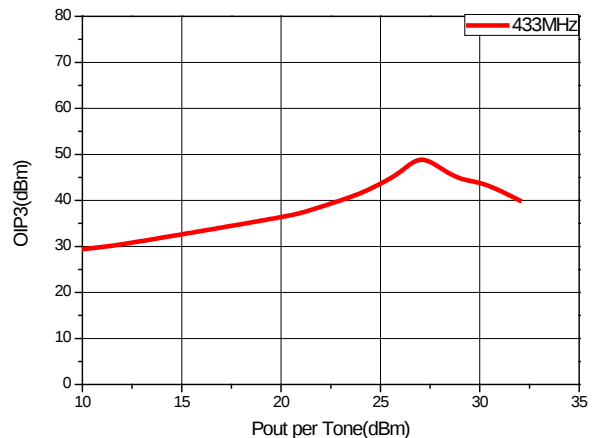
Gain vs. Input Power



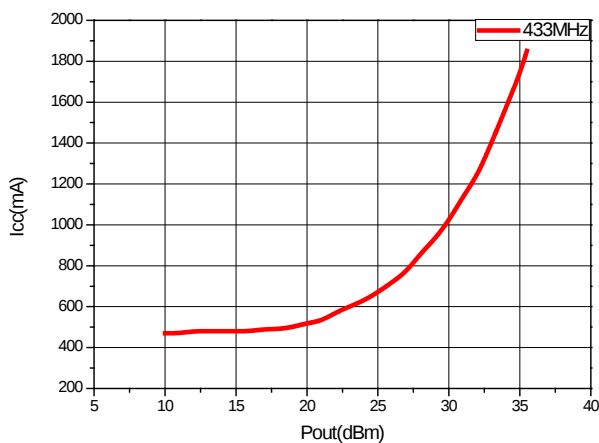
P1dB vs. Frequency



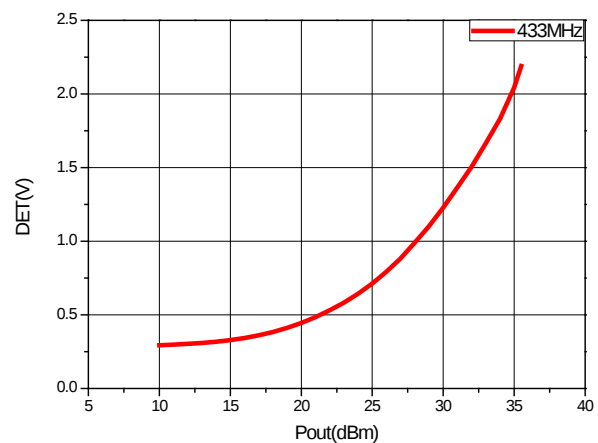
Output IP3 vs. Tone Power@433MHz



ICC vs. Output Power



DET vs. Output Power

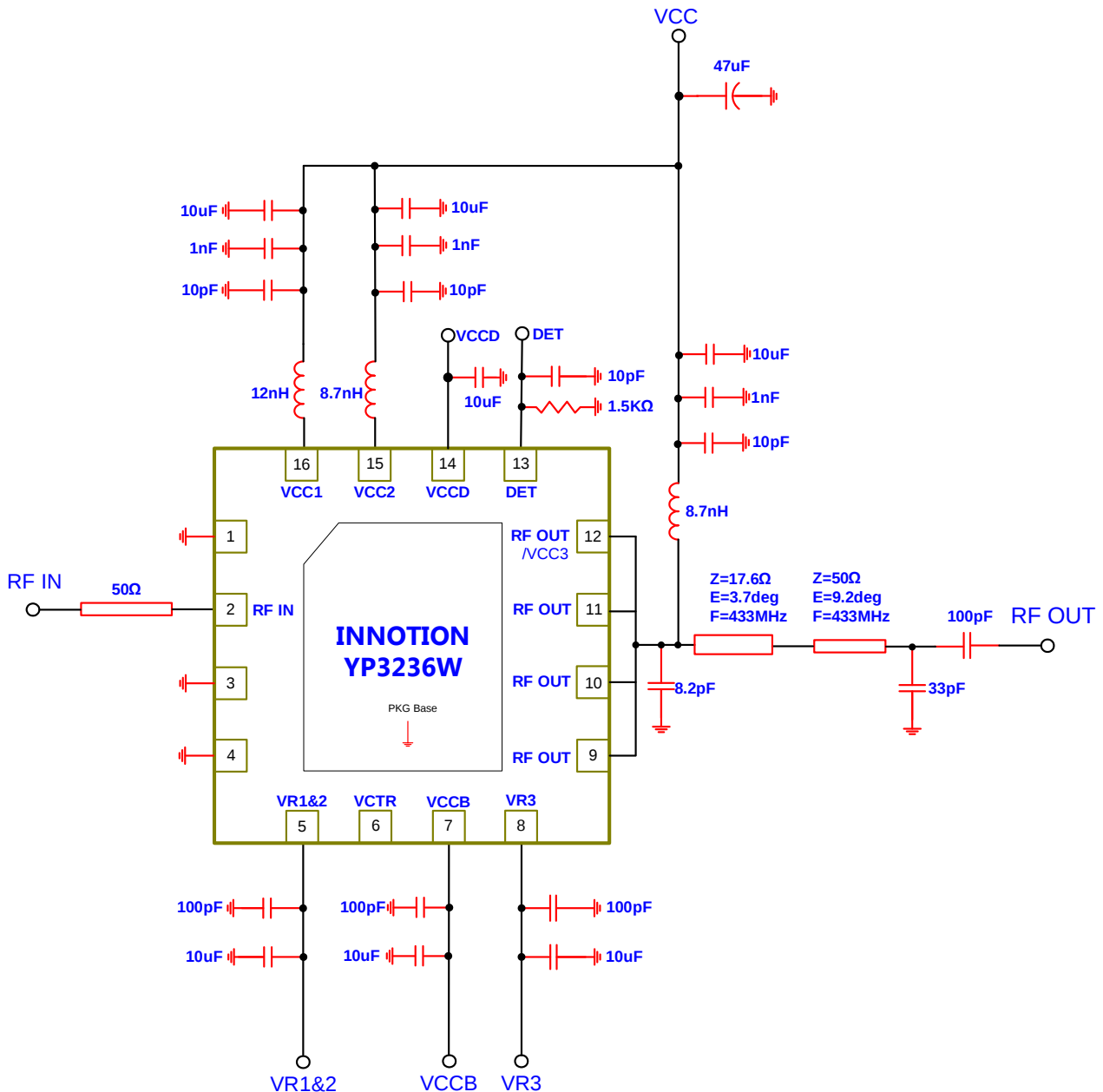


Application circuit

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

(Test Condition: $V_{CCB}=V_{CC}=5.0V$, $VR1\&2=VR3=2.6V$, $I_{CQ}=250mA$, $T_{OP}=+25^{\circ}C$)

Application Schematic



Notes:

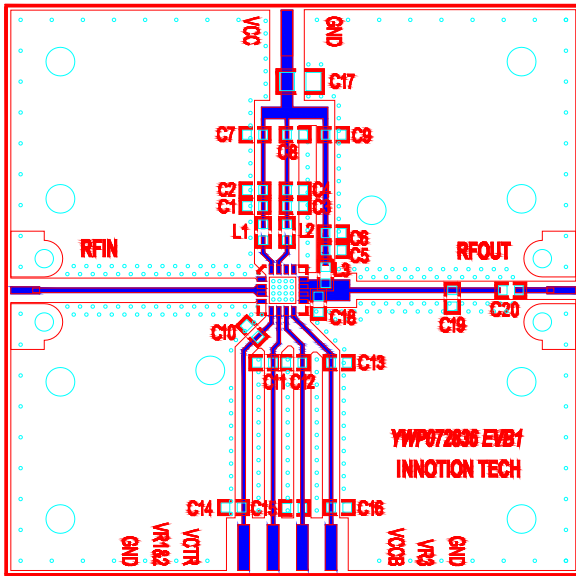
1. Pin6 is power down pin. Apply $>1.5 V_{DC}$ to power down the three power amplifier stages. Apply $0V_{DC}$ to power up. If the function is not desired, pin6 may be connected to GND.
2. Pin13, 14 are active power detection circuit ports. If the function is not desired, pin13, 14 may be left unterminated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

Evaluation Board Layout

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

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

Evaluation Board Top View



Layer Detail Physical Characteristics

Cross Section	Name	Thickness	Material	ϵ_r
Via14	RFS	1 oz	Cu	--
	Core 1	0.23 mm	FR-4	4.5
	RFGND	1 oz	Cu	--
			FR-4	4.5
	PCS	1 oz	Cu	--
			FR-4	4.5
	GND	1oz	Cu	--

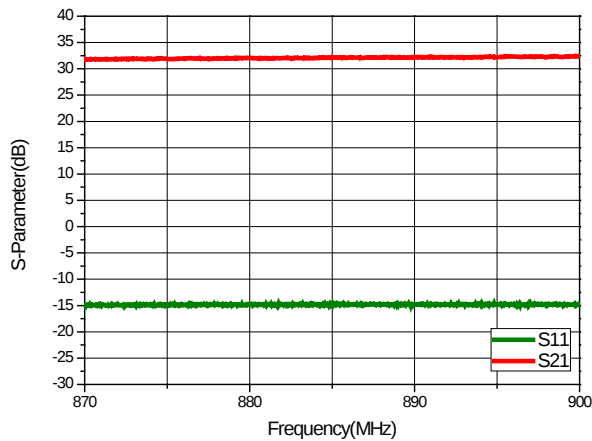
■ Table 6: Circuit Component Designations and Values

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

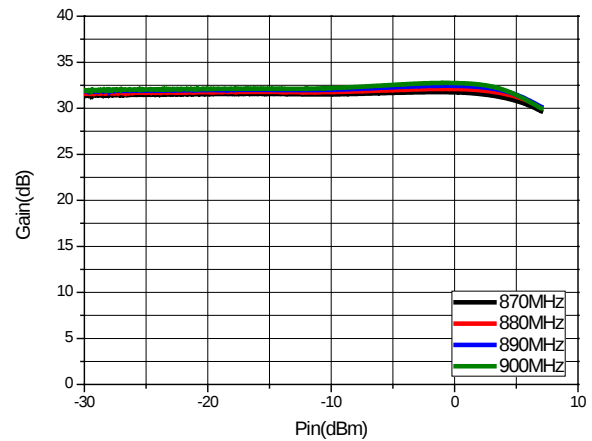
Typical Performance Data 02

(Frequency range: 870MHz~900MHz)

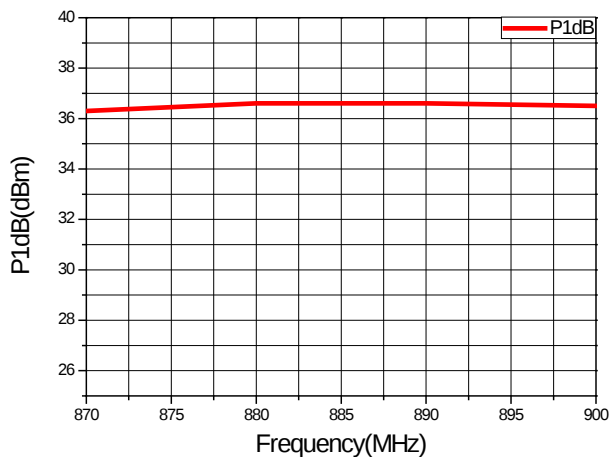
Small Signal Parameters



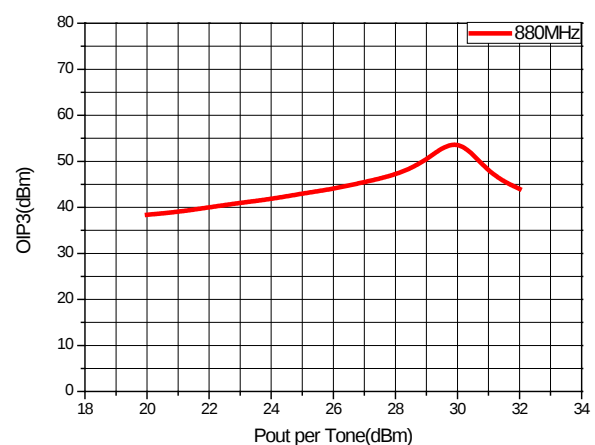
Gain vs. Input Power



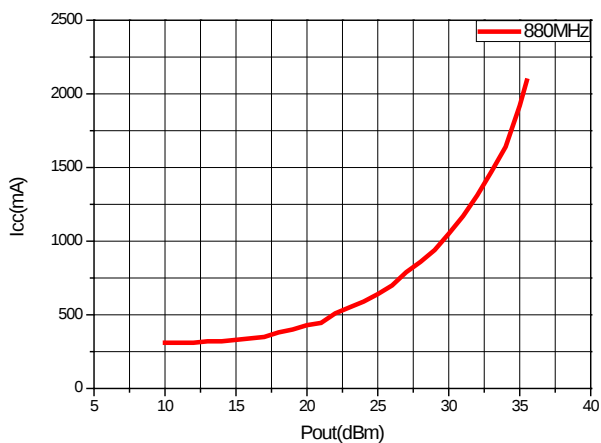
P1dB vs. Frequency



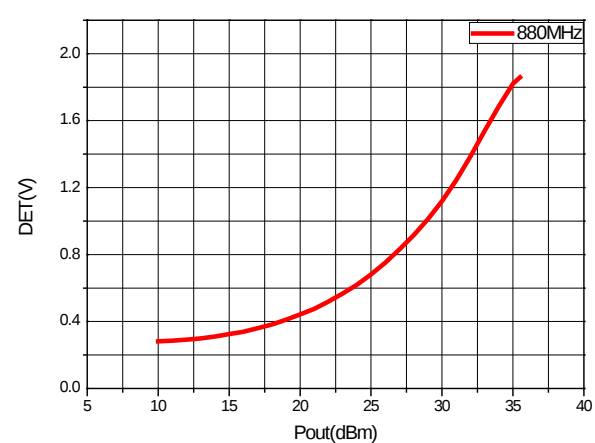
Output IP3 vs. Tone Power@880MHz



ICC vs. Output Power



DET vs. Output Power

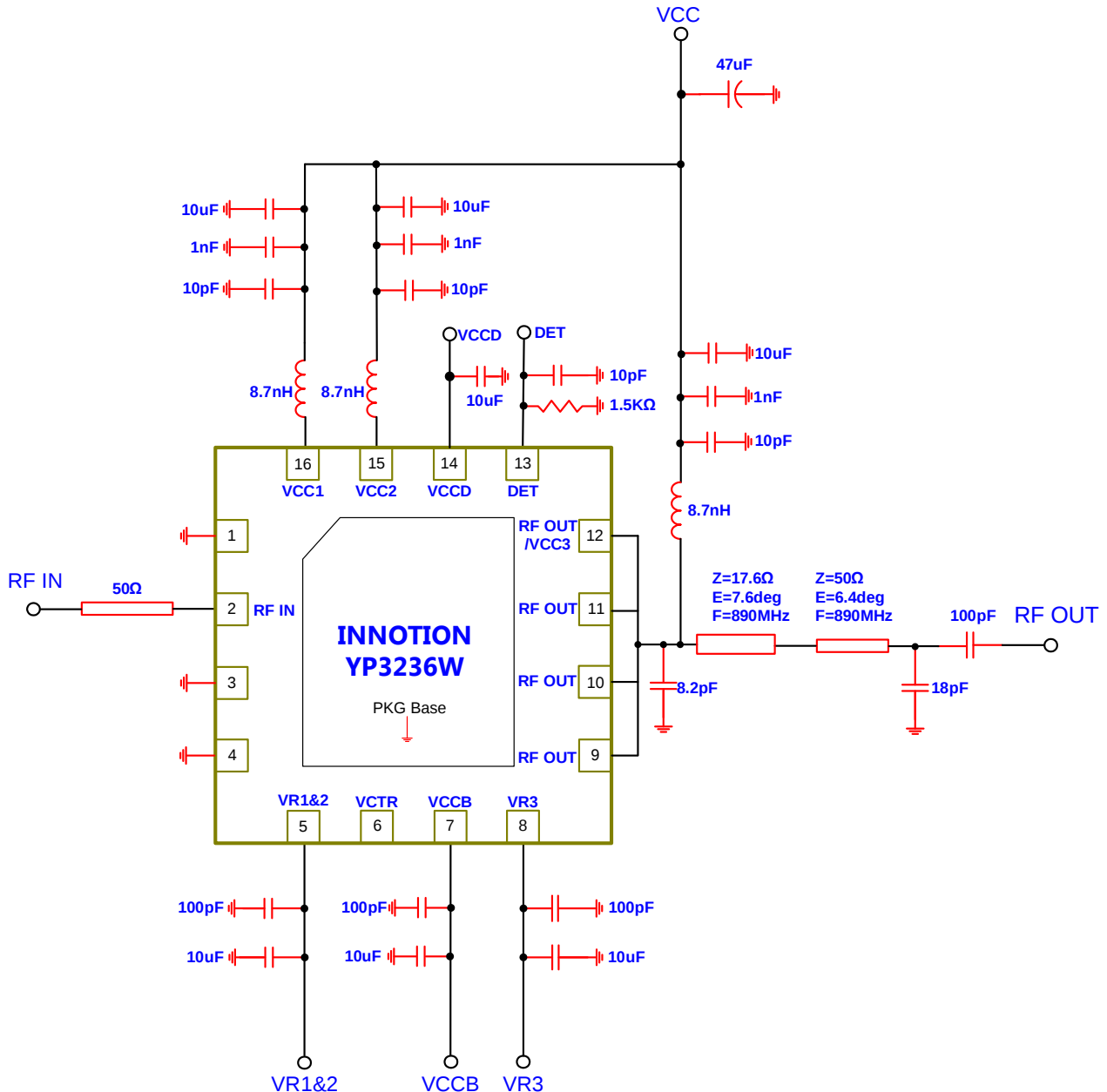


Application circuit

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

(Test Condition: $VCC=VCCB=5.0V$, $VR1\&2=VR3=2.65V$, $ICQ=300mA$, $T_{OP}=+25^{\circ}C$)

Application Schematic



Notes:

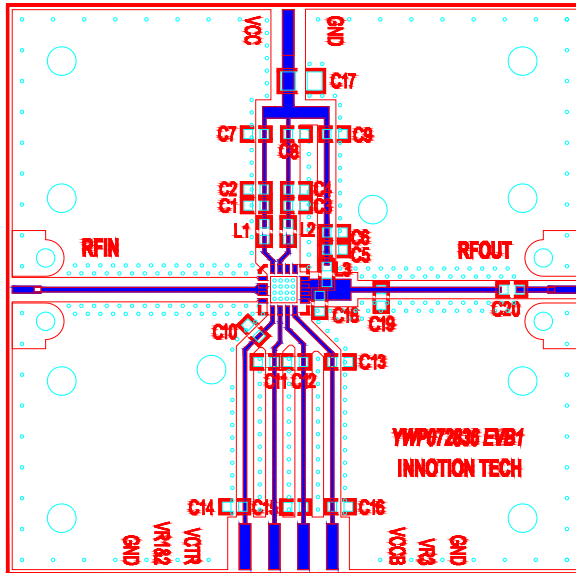
1. Pin6(VCTR) is power down pin. Apply $>1.5 V_{DC}$ to power down the three power amplifier stages. Apply $0V_{DC}$ to power up. If function is not desired, pin6 may be connected to GND.
2. Pin13, 14 are active power detection circuit ports, if function is not desired, pin13, 14 may be left unterminated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

Evaluation Board Layout

(Frequency range: 870MHz~900MHz)

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

Evaluation Board Top View



Layer Detail Physical Characteristics

Cross Section	Name	Thickness	Material	ϵ_r
Via14	RFS	1 oz	Cu	--
	Core 1	0.23 mm	FR-4	4.5
	RFGND	1 oz	Cu	--
			FR-4	4.5
	PCS	1 oz	Cu	--
			FR-4	4.5
	GND	1oz	Cu	--

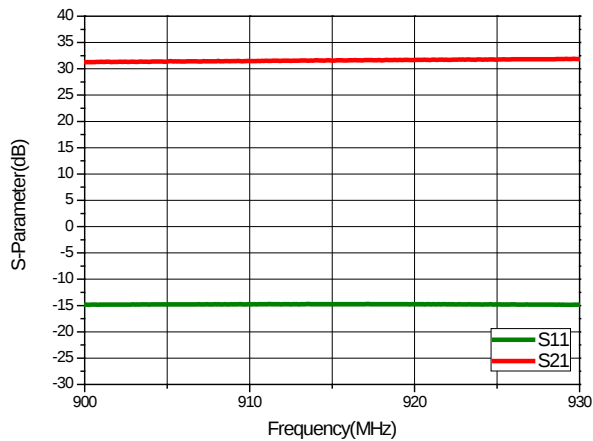
■ Table 7: Circuit Component Designations and Values

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

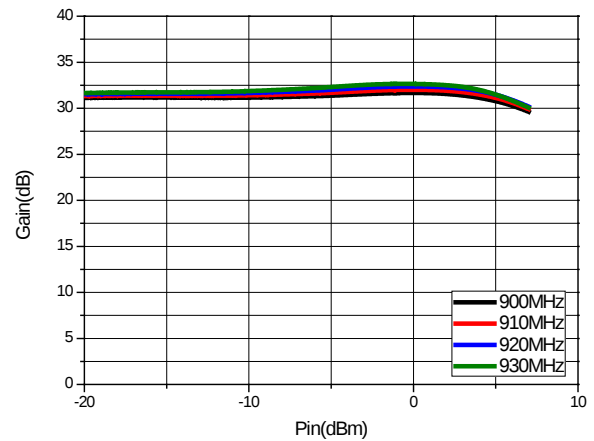
Typical Performance Data 03

(Frequency range: 900MHz~930MHz)

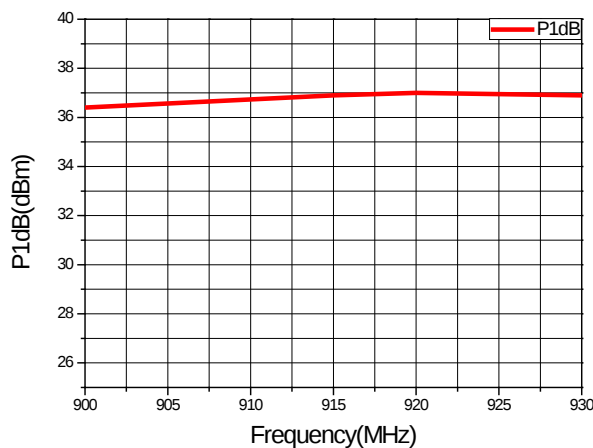
Small Signal Parameters



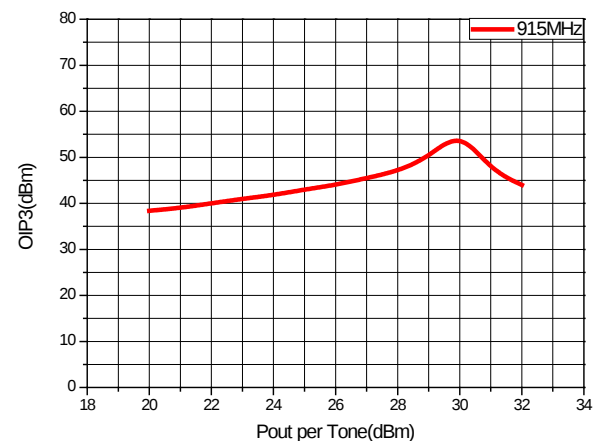
Gain vs. Input Power



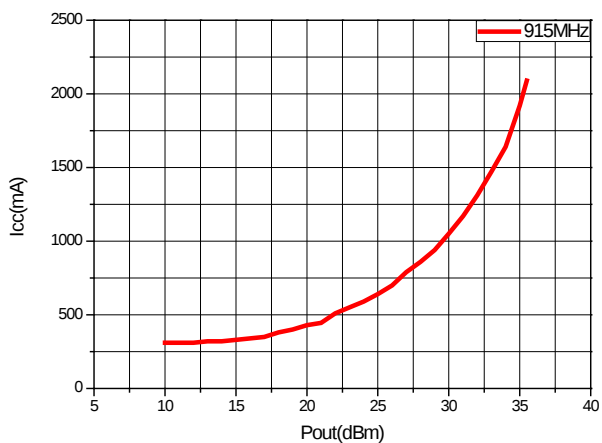
P1dB vs. Frequency



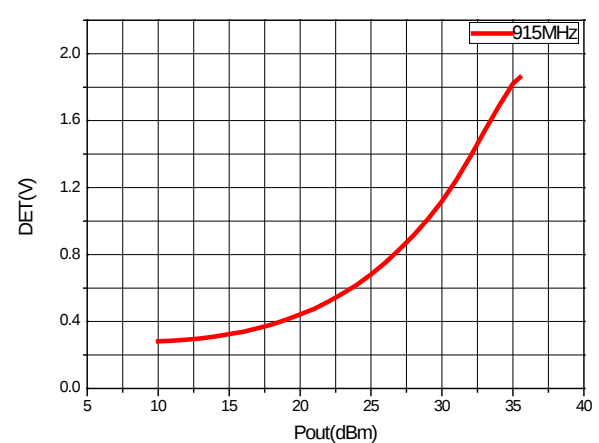
Output IP3 vs. Tone Power@915MHz



ICC vs. Output Power



DET vs. Output Power

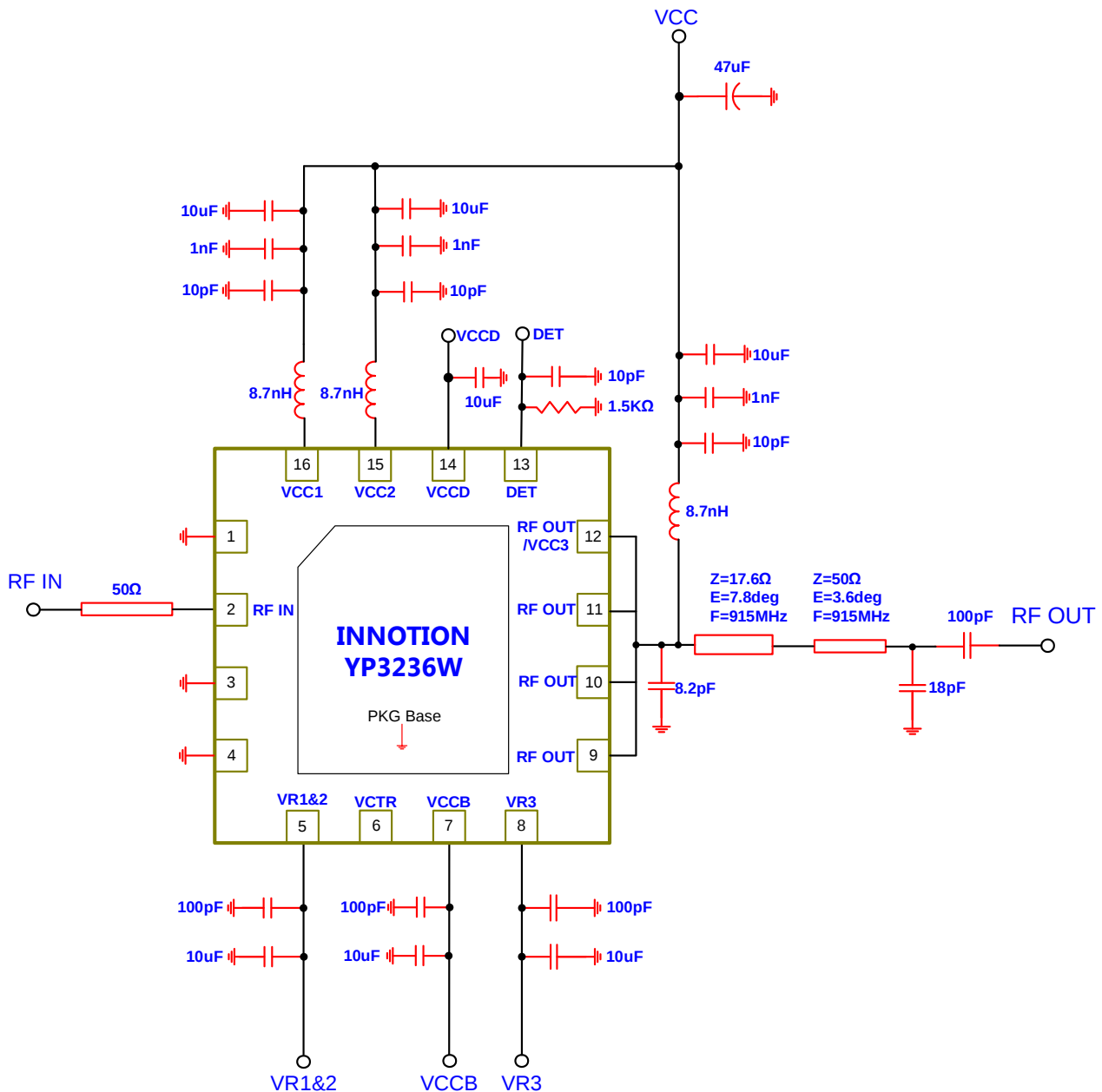


Application circuit

RFID (Frequency range: 900MHz~930MHz)

(Test Condition: $V_{CC}=V_{CCB}=5.0V$, $VR1\&2=VR3=2.65V$, $I_{CQ}=300mA$, $T=25^{\circ}C$)

Application Schematic



Notes:

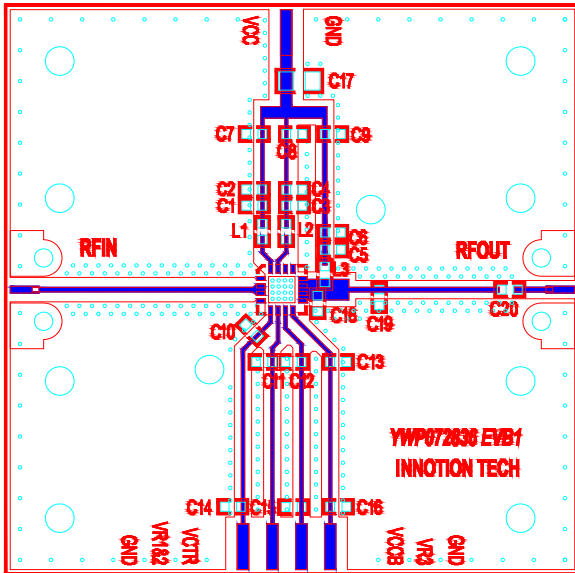
1. Pin6(VCTR) is power down pin. Apply $>1.5 V_{DC}$ to power down the three power amplifier stages. Apply $0V_{DC}$ to power up. If function is not desired, pin6 may be connected to GND.
2. Pin13, 14 are active power detection circuit ports, if function is not desired, pin13, 14 may be left unterminated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

Evaluation Board Layout

(Frequency range: 900MHz~930MHz)

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

Evaluation Board Top View



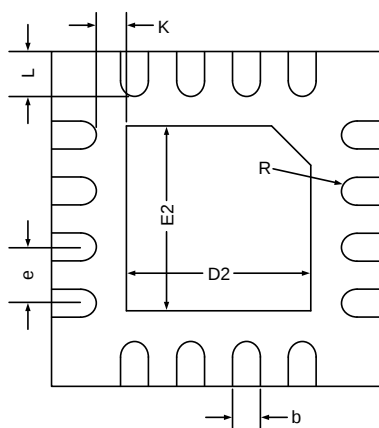
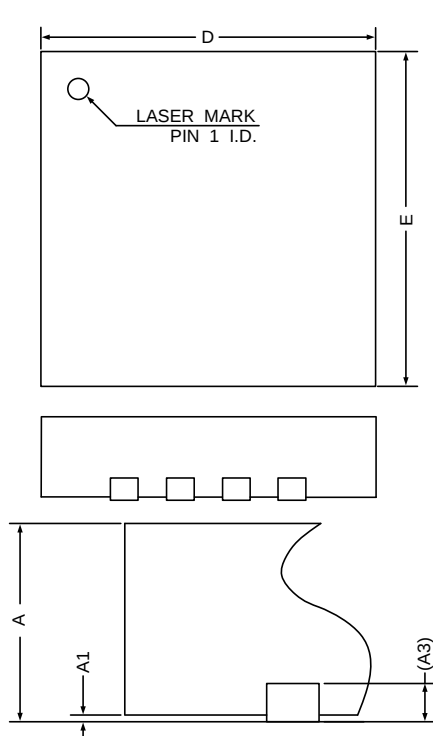
Layer Detail Physical Characteristics

Cross Section	Name	Thickness	Material	ϵ_r
Via14	RFS	1 oz	Cu	--
	Core 1	0.23 mm	FR-4	4.5
	RFGND	1 oz	Cu	--
			FR-4	4.5
	PCS	1 oz	Cu	--
			FR-4	4.5
	GND	1oz	Cu	--

■ Table 8: 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

Packaging Diagram



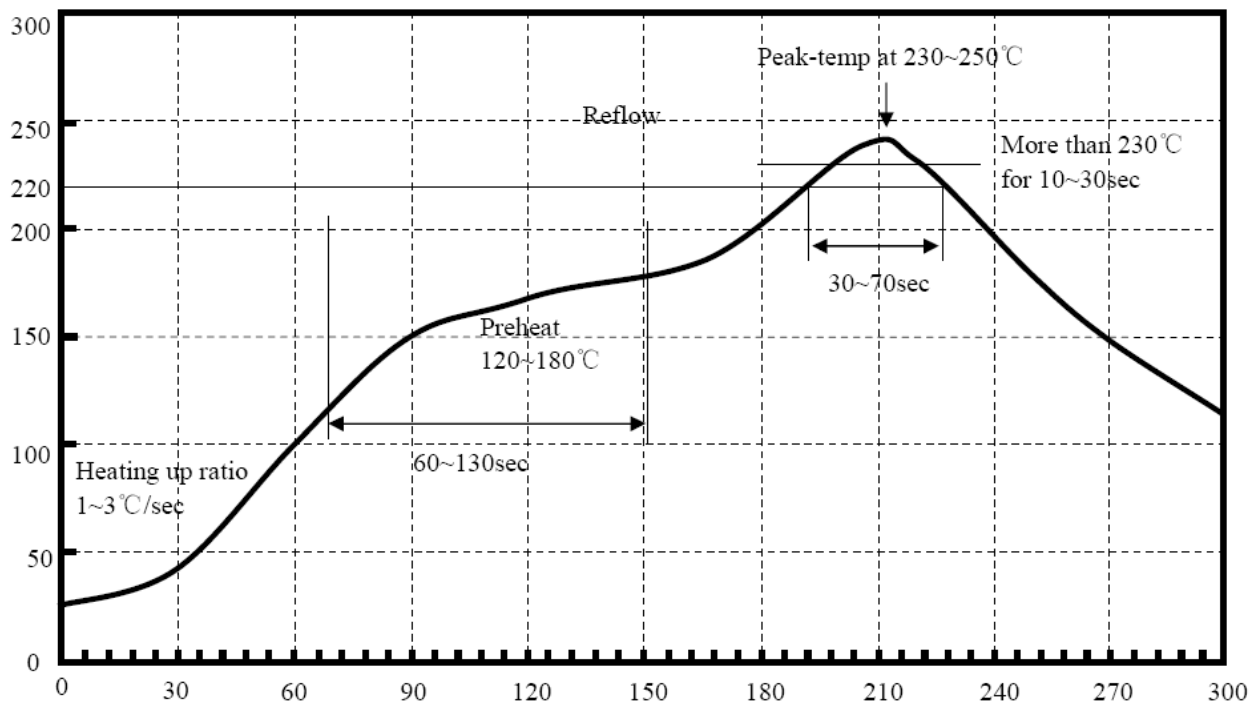
COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

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.

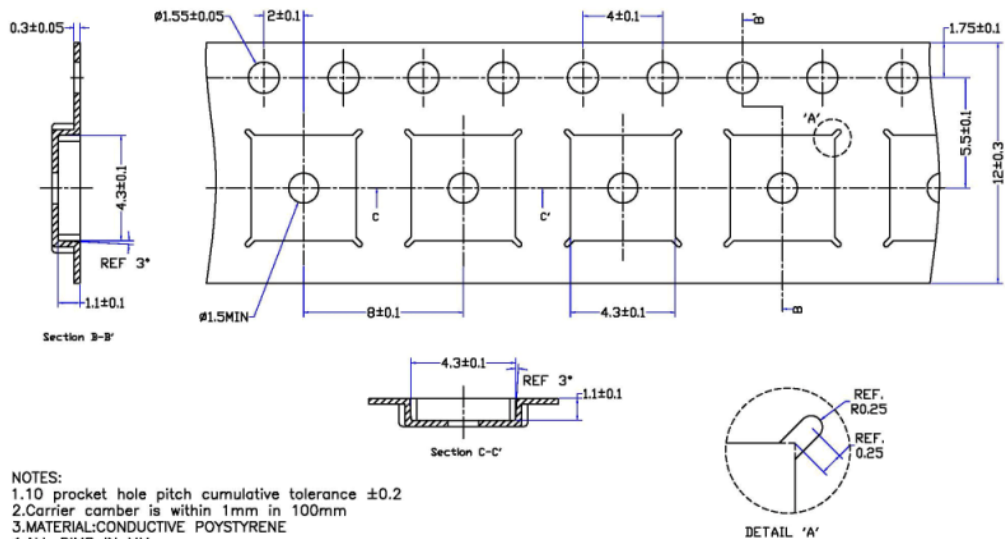
Recommended Solder Temperature



Recommended Temperature

Sn95.5Ag4.0Cu0.5

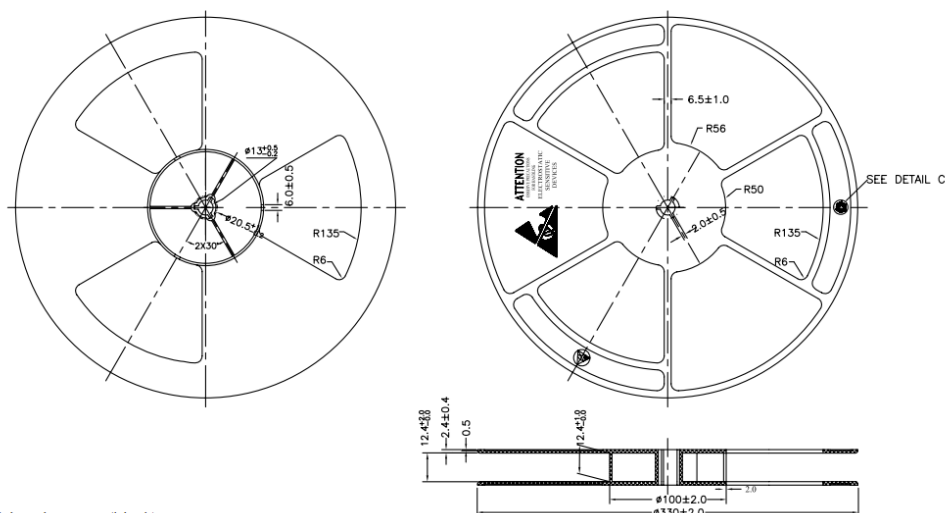
Tape dimensions and Orientation



NOTES:

- 1.10 pocket hole pitch cumulative tolerance ± 0.2
2. Carrier camber is within 1mm in 100mm
3. MATERIAL: CONDUCTIVE POLYSTYRENE
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, 51875 pockets
7. Surface resistance $1 \times 10^{11}(\text{max})$ 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: 10^5 TO 10^{10} /OHMS/SQ;
5. General tolerances: ± 0.25