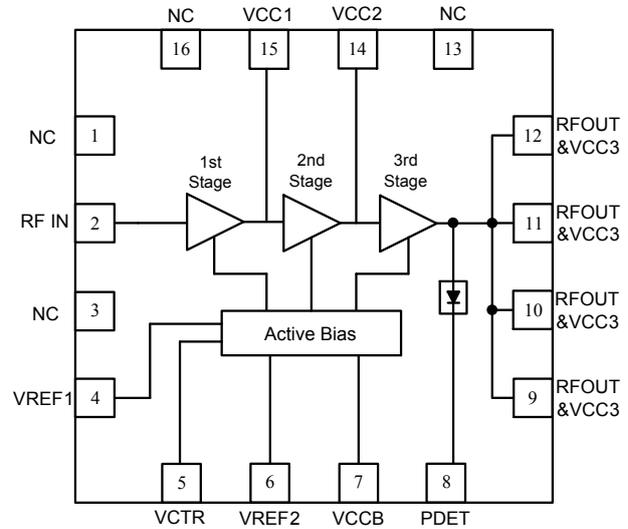


Features

RoHS & Pb-Free Product

- 1.8GHz-3.8GHz Frequency Range
- 29dB Gain (Typ.) @ 3.5GHz
- 30dBm P_{-1dB} @ 3.5GHz
- 120mA Quiescent Current @ Supply Voltage=5V
- 5.0V Supply Voltage
- Integrated Output Power Detector
- ESD protection all ports above 1000V HBM, forward and reverse voltage



Functional Block Diagram

Applications

- 5G mobile application
- 2.4GHz ISM Wireless Equipment
- WCDMA / TD-SCDMA

Product Description

The YP352830 is a three-stage, high dynamic range broadband power amplifier using an advanced InGaP/GaAs HBT process, which is optimized for the applications in bands from 1800MHz to 3800MHz (It needs different matching circuit for different frequency range). This amplifier provides 29dB gain and 30dBm P_{1dB} at 3.5GHz while drawing 900mA operating current from a 5V typical bias condition. The YP352830 is assembled in a 16-pin, 4×4mm², QFN package. It is internally integrated with ESD protection circuitry on all ports.

Ordering Information

- YP352830 1.8GHz to 3.8GHz Power Amplifier
- YP352830-EVB 3.4GHz-3.6GHz, 2.515GHz-2.675GHz, 2.4GHz-2.5GHz, 2.0GHz-2.2GHz
Evaluation Board

Pin Description

Pin No.	Symbol	Description
1, 3, 13, 16	NC/ GND	No connection or connect to ground
2	RF IN	RF input
4, 6	VREF1, VREF2	Bias current control voltage
5	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, pin5 may be connected to GND
7	VCCB	Supply voltage for bias circuit
8	PDET	Output power detector
9, 10, 11, 12	RFOUT&VCC3	RF output and Stage3 supply voltage
14, 15	VCC2, VCC1	Stage2, Stage1 supply voltage
PKG Base	GND	Ground connection

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Input RF Power with 50Ω Output Load	RF IN	+5	dBm
Supply Voltage	VCC1,VCC2, VCC3,VCCB	-0.5 to +8.0	V
Reference Voltage	VREF1, VREF2	-0.5 to +2.9	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 Characteristics

For 5G Application (3.4GHz-3.6GHz)

Parameter	Specification			Unit	Conditions
	Min.	Typ.	Max.		
Compliance and Nominal Conditions					VCC1=VCC2=VCC3=VCCB=5V, ICQ=120mA, T _{OP} =+25°C, Freq=3.4GHz to 3.6GHz
Frequency Range	3.4	3.5	3.6	GHz	
P _{-1dB}		30		dBm	3.5GHz
Small Signal Gain, S ₂₁		29		dB	
Input return loss, S ₁₁		22		dB	
Power Supply					
Reference Voltage, VREF1		2.67		V	
Reference Voltage, VREF2		2.57		V	
Quiescent Current, ICQ		120		mA	no RFin
Operating Current, ICC		900		mA	@Pout=30dBm, 3.5GHz

For 5G Application (2.515GHz-2.675GHz)

Parameter	Specification			Unit	Conditions
	Min.	Typ.	Max.		
Compliance and Nominal conditions					VCC1=VCC2=VCC3=VCCB=5V, ICQ=280mA, T _{OP} =+25°C, Freq=2.515GHz to 2.675 GHz
Frequency Range	2.515	2.65	2.675	GHz	
P _{-1dB}		33		dBm	2.65GHz
Small Signal Gain, S ₂₁		31		dB	
Input return loss, S ₁₁		-20		dB	
Power Supply					
Reference Voltage, VREF1		2.66		V	
Reference Voltage, VREF2		2.66		V	
Quiescent Current, ICQ		280		mA	no RFin
Operating Current, ICC		900		mA	@Pout=30dBm, 2.65GHz

For 2.4G WLAN Application (2.4GHz-2.5GHz)

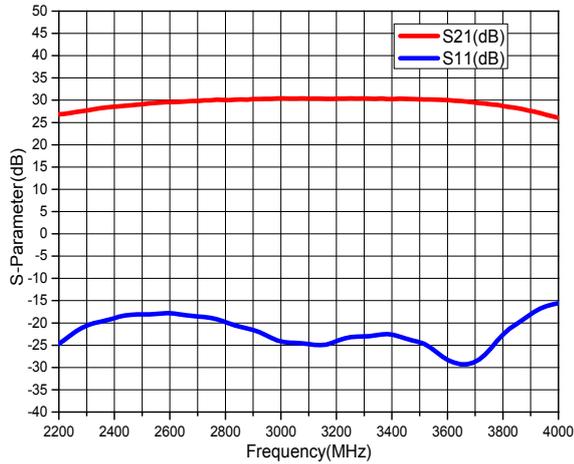
Parameter	Specification			Unit	Conditions
	Min.	Typ.	Max.		
Compliance and Nominal conditions					VCC1=VCC2=VCC3=VCCB=5V, ICQ=250mA, T _{OP} =+25°C, Freq=2.4GHz to 2.5 GHz
Frequency Range	2.4	2.45	2.5	GHz	
P _{-1dB}		33		dBm	2.45GHz
Small Signal Gain, S ₂₁		31		dB	
Input return loss, S ₁₁		-20		dB	
Power Supply					
Reference Voltage, VREF1		2.66		V	
Reference Voltage, VREF2		2.66		V	
Quiescent Current, ICQ		250		mA	no RFin
Operating Current, ICC		800		mA	@Pout=30dBm, 2.45GHz

Typical Performance

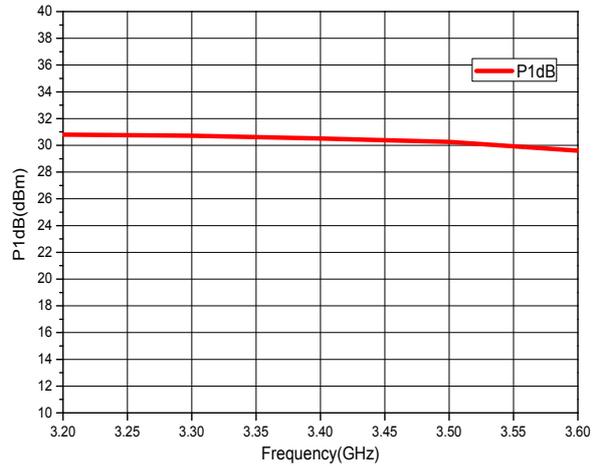
(Frequency range: 3.4GHz-3.6GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=120mA(no RF), T_{OP}=+25°C

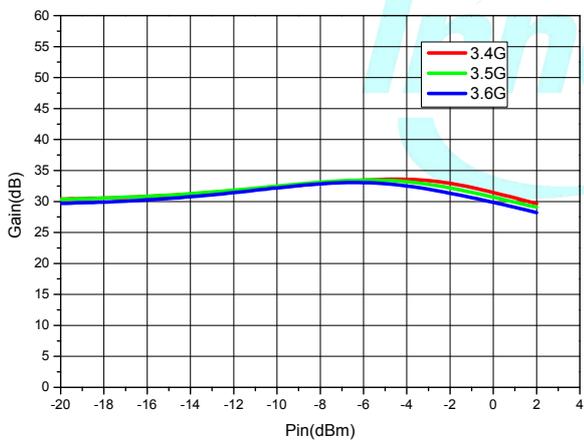
Gain & Return Loss



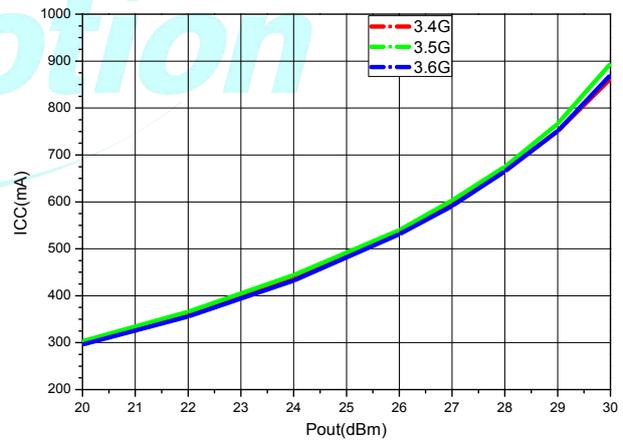
P1dB vs. Frequency



Power Gain vs. Input Power



ICC vs. Output Power

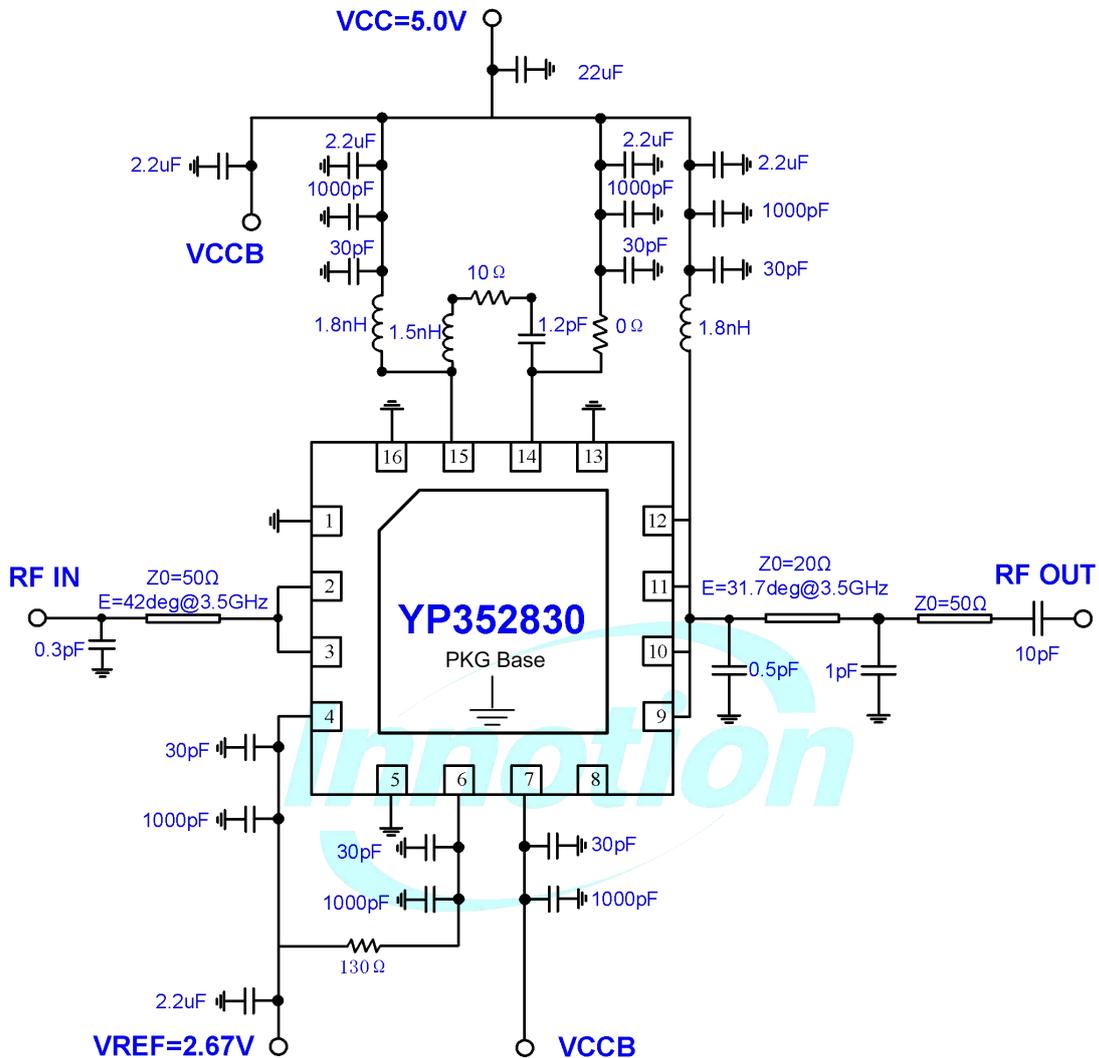


Note: Adjust VREF1 & VREF2 to achieve ICQ=120mA

Evaluation Board Schematic

(Frequency range: 3.4GHz-3.6GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=120mA(no RFin), T_{OP}=+25°C



Notes:

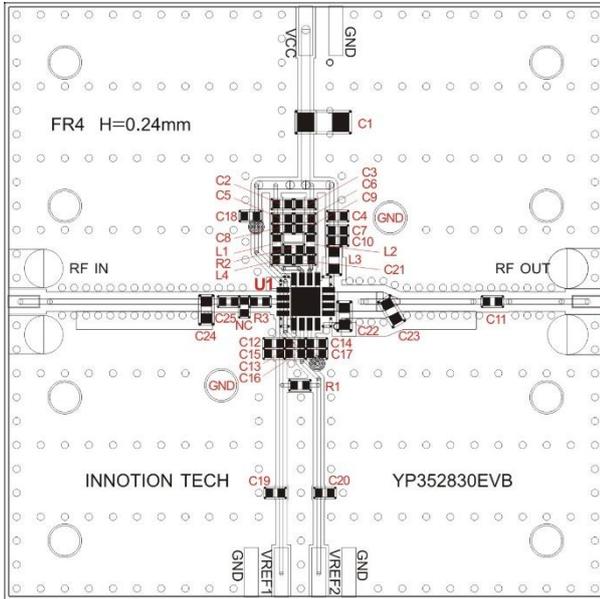
1. Pin5 is power down pin. Apply >2.5 V_{DC} to power off the PA. Apply 0 V_{DC} to power on. If the function is not desired, this pin may be connected to GND.
2. Pin8 is active power detection port, if the function is not desired, this pin need to left unterminated (open).
3. Adjust VREF1 & VREF2 to achieve ICQ=120mA

Evaluation Board Layout

Board Size 50mm×50mm

Board Thickness 0.9mm, Board Material FR4, Multi-Layer

Evaluation Board View



Layer Details of DEMO Board

Cross Section	Name	Thickness	Material	Er
Via14	Top-Layer	1 oz	Cu	--
	Core 1	240um	FR-4	4.2
	Mid-Layer1	1 oz	Cu	--
			FR-4	4.2
	Mid-Layer2	1 oz	Cu	--
			FR-4	4.2
	Bottom-Layer	1oz	Cu	--

Circuit Component Designations and Values

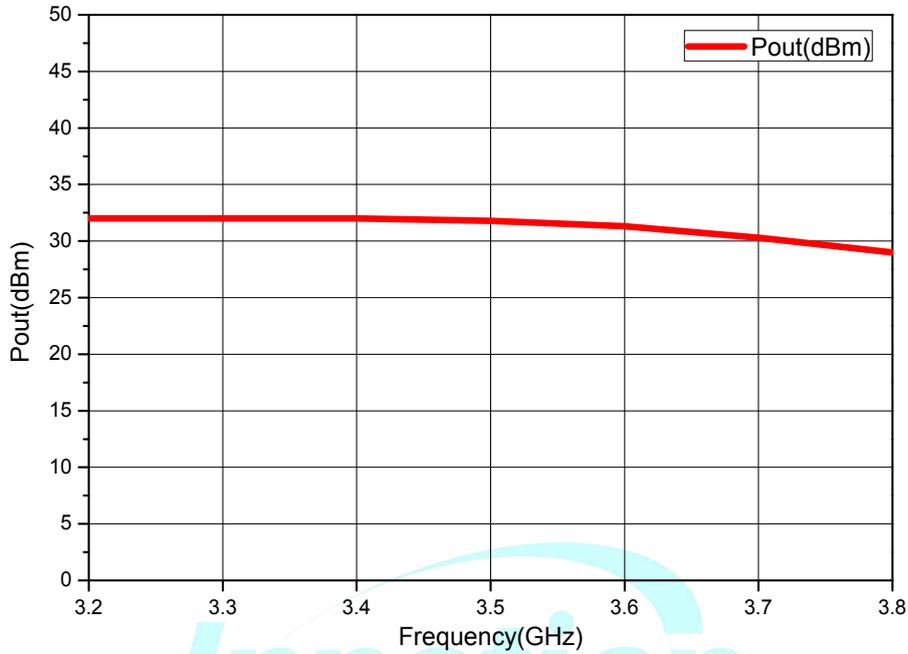
Component	Value	Manufacturer
C1	22uF	AVX
C2, C3, C4, C18, C19, C20	2.2uF	TDK
C5, C6, C7, C15, C16, C17	1000pF	TDK
C8, C9, C10, C12, C13, C14	30pF	TDK
C11, C25	10pF	TDK
C21	1.2pF	TDK
C23	1pF	DLC
C22	0.5pF	DLC
C24	0.3pF	DLC
R1	130Ω	YAGEO
R2	10Ω	YAGEO
L2, R3	0Ω	YAGEO
L1	1.8nH	TDK
L3	1.8nH	Coilcraft
L4	1.5nH	TDK
U1	YP352830	Innotion

Typical Performance

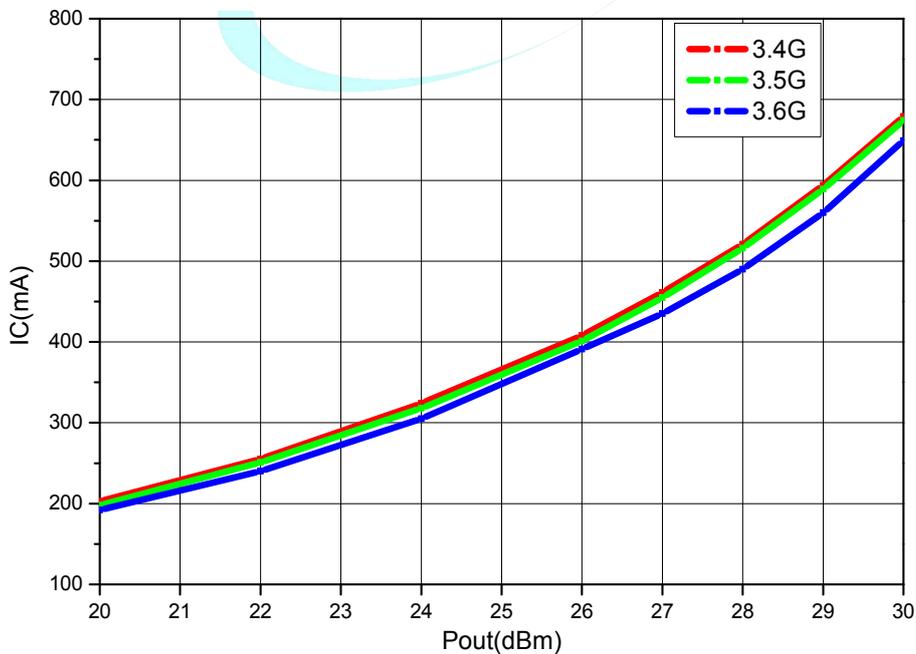
(Frequency range: 3.4GHz-3.6GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=10mA(no RF), TOP=+25°C

Pout vs. Frequency



ICC vs. Output Power

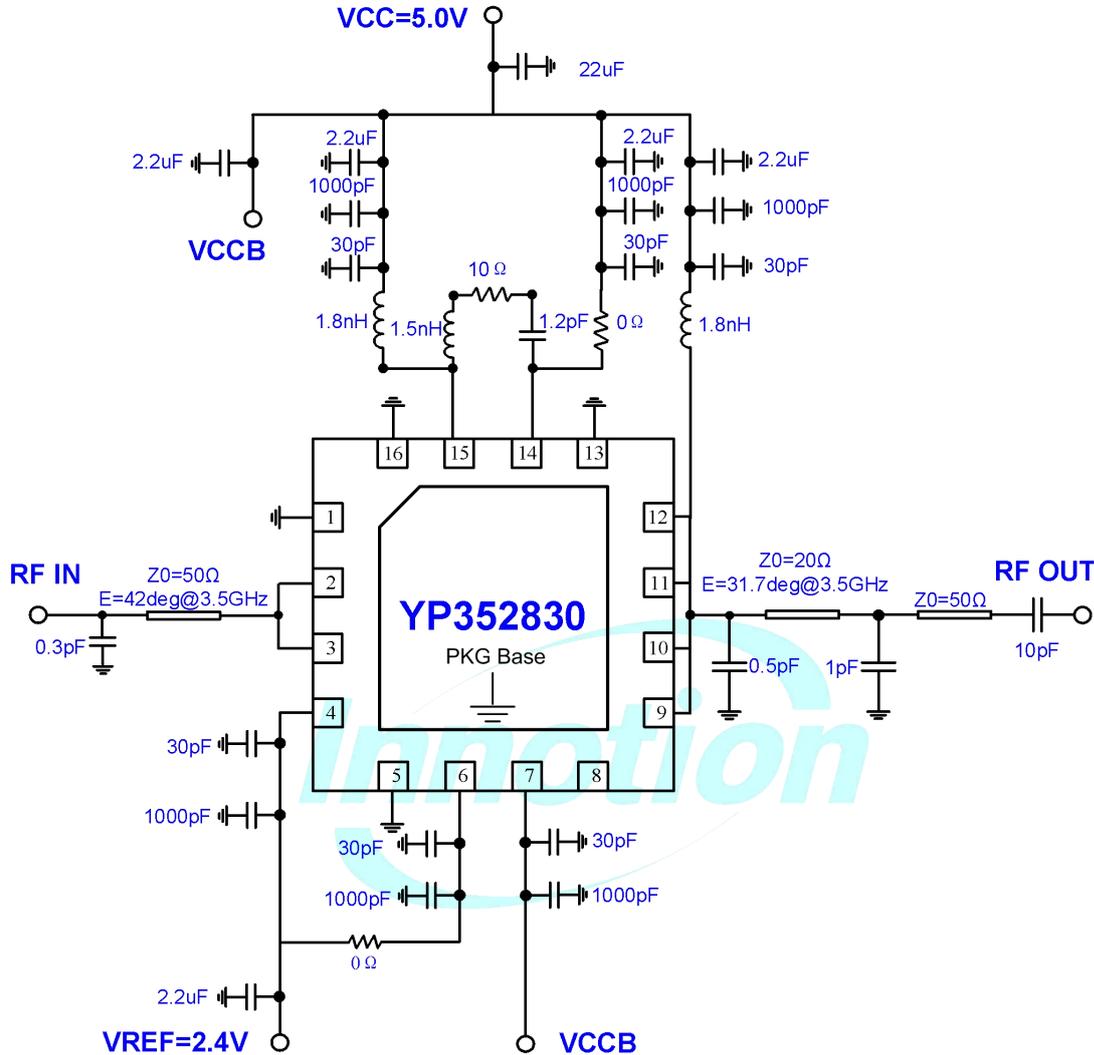


Note: Adjust VREF1 & VREF2 to achieve ICQ=10mA

Evaluation Board Schematic

(Frequency range: 3.4GHz-3.6GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=10mA(no RFin), T_{OP}=+25°C



Notes:

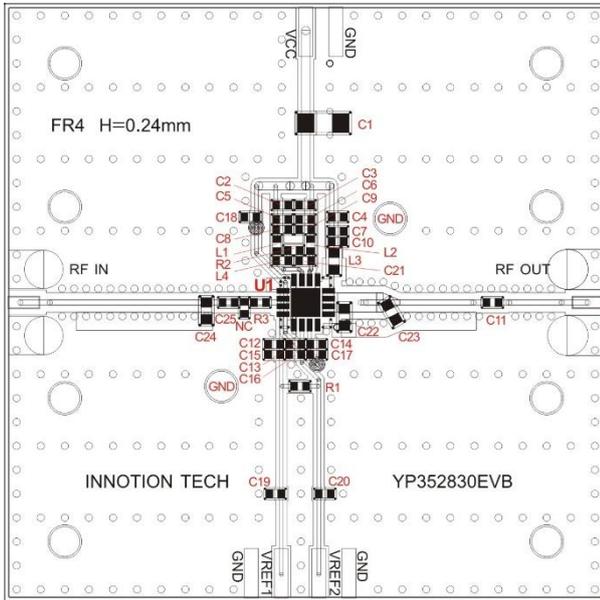
1. Pin5 is power down pin. Apply >2.5 V_{DC} to power off the PA. Apply 0 V_{DC} to power on. If the function is not desired, this pin may be connected to GND.
2. Pin8 is active power detection port, if the function is not desired, this pin need to left unterminated (open).
3. Adjust VREF1 & VREF2 to achieve ICQ=10mA

Evaluation Board Layout

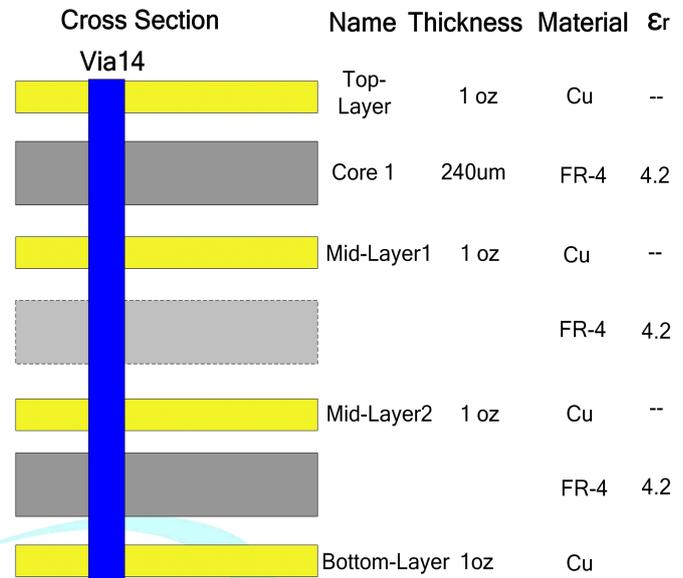
Board Size 50mm×50mm

Board Thickness 0.9mm, Board Material FR4, Multi-Layer

Evaluation Board View



Layer Details of DEMO Board



Circuit Component Designations and Values

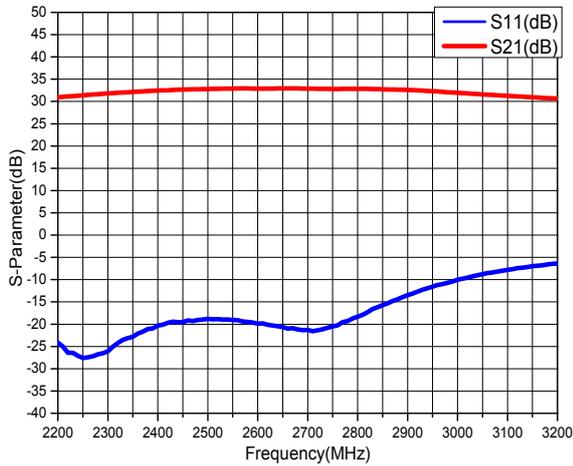
Component	Value	Manufacturer
C1	22uF	AVX
C2, C3, C4, C18, C19, C20	2.2uF	TDK
C5, C6, C7, C15, C16, C17	1000pF	TDK
C8, C9, C10, C12, C13, C14	30pF	TDK
C11, C25	10pF	TDK
C21	1.2pF	TDK
C23	1pF	DLC
C22	0.5pF	DLC
C24	0.3pF	DLC
R2	10Ω	YAGEO
L2, R3	0Ω	YAGEO
L1	1.8nH	TDK
L3	1.8nH	Coilcraft
L4	1.5nH	TDK
U1	YP352830	Innotion

Typical Performance

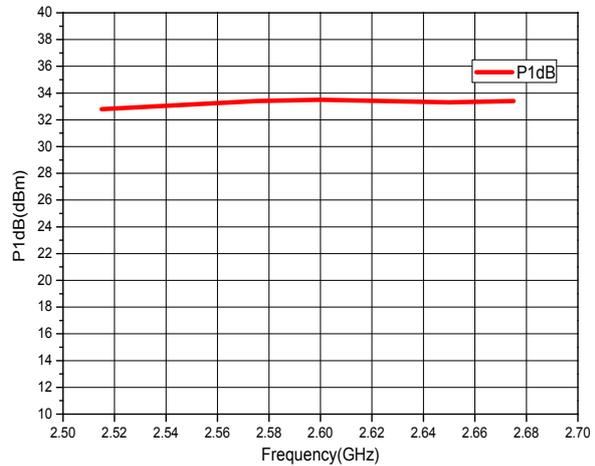
(Frequency range: 2.515GHz-2.675GHz)

VCC1= VCC2=VCC3=VCCB=5V, ICQ=280mA(no RF), T_{OP}=+25°C

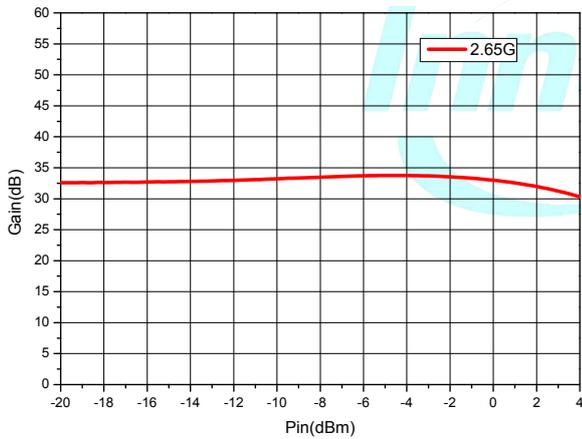
Gain & Return Loss



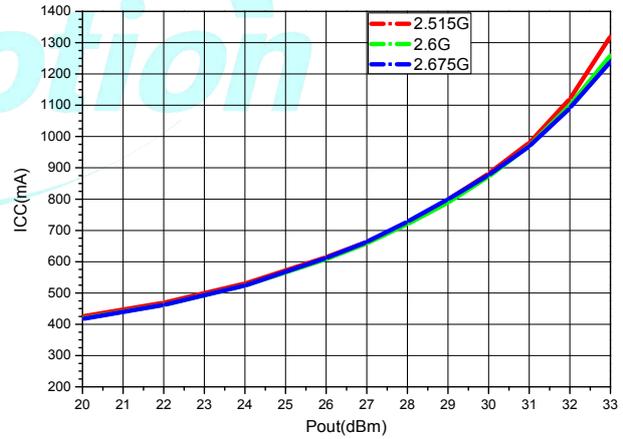
P1dB vs. Frequency



Power Gain vs. Input Power



ICC vs. Output Power



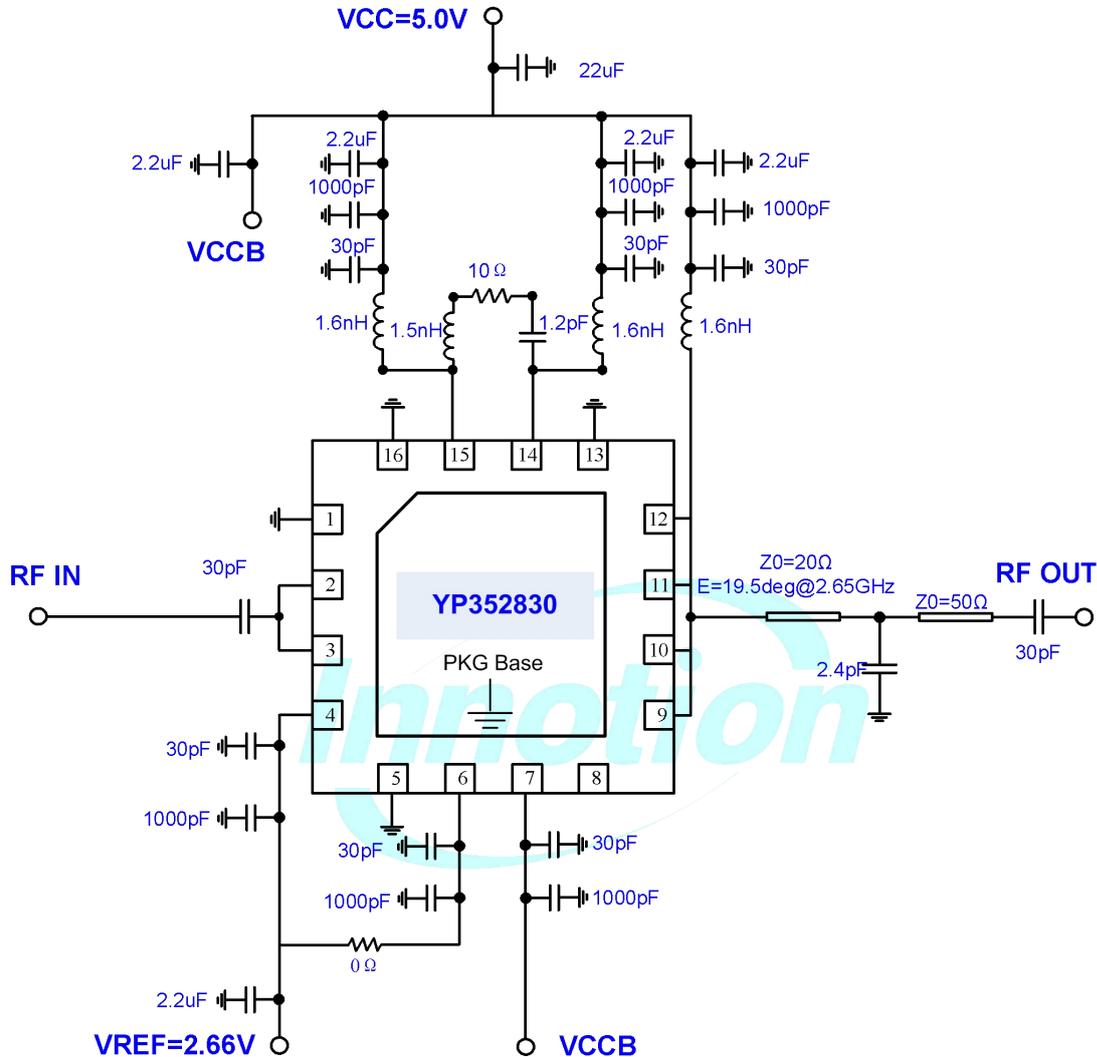
Note

Ajust VREF1 & VREF2 to achieve ICQ=280mA

Evaluation Board Schematic

(Frequency range: 2.515GHz-2.675GHz)

VCC1= VCC2=VCC3=VCCB=5V, ICQ=280mA(no RFin), T_{OP}=+25°C



Notes:

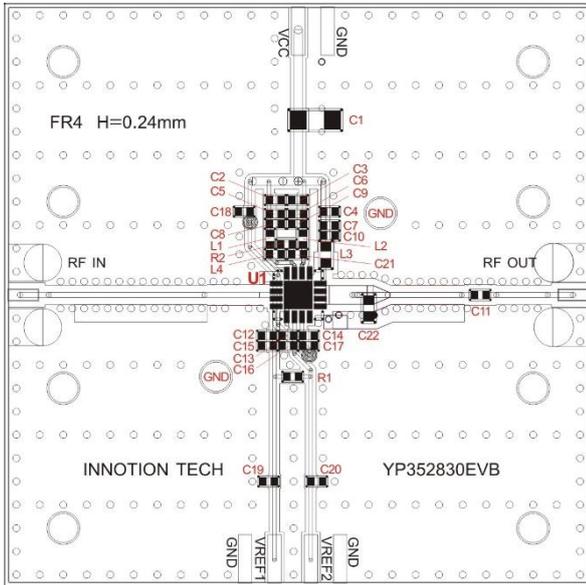
1. Pin5 is power down pin. Apply >2.5 V_{DC} to power off the PA. Apply 0 V_{DC} to power on. If the function is not desired, this pin may be connected to GND.
2. Pin8 is active power detection port, if the function is not desired, this pin need to left unterminated (open).
3. Adjust VREF1 & VREF2 to achieve ICQ=280mA

Evaluation Board Layout

Board Size 50mm×50mm

Board Thickness 0.9mm, Board Material FR4, Multi-Layer

Evaluation Board View



Layer Details of DEMO Board

Cross Section	Name	Thickness	Material	Er
Via14	Top-Layer	1 oz	Cu	--
	Core 1	240um	FR-4	4.2
	Mid-Layer1	1 oz	Cu	--
			FR-4	4.2
	Mid-Layer2	1 oz	Cu	--
			FR-4	4.2
	Bottom-Layer	1oz	Cu	--



Circuit Component Designations and Values

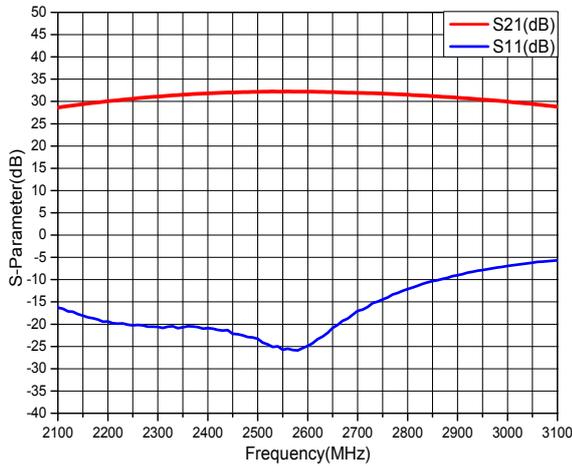
Component	Value	Manufacturer
C1	22uF	AVX
C2, C3, C4, C18, C19, C20	2.2uF	TDK
C5, C6, C7, C15, C16, C17	1000pF	TDK
C8, C9, C10, C11, C12, C13, C14	30pF	TDK
C21	1.2pF	TDK
C22	2.4pF	DLC
R2	10Ω	YAGEO
R1	0Ω	YAGEO
L4	1.5nH	TDK
L1, L2	1.6nH	TDK
L3	1.6nH	Coilcraft
U1	YP352830	Innotion

Typical Performance

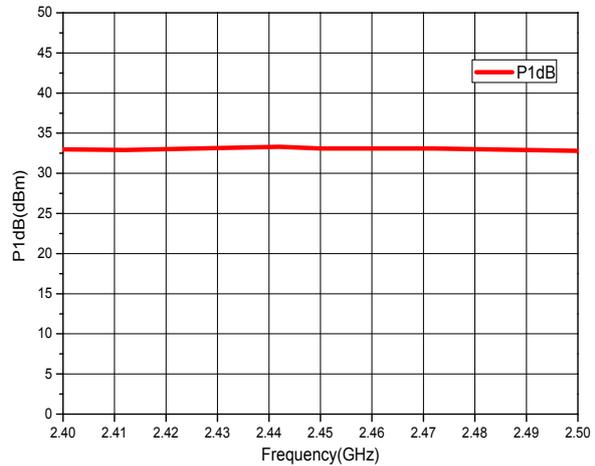
(Frequency range: 2.4GHz-2.5GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=210mA(no RFin), TOP=+25°C

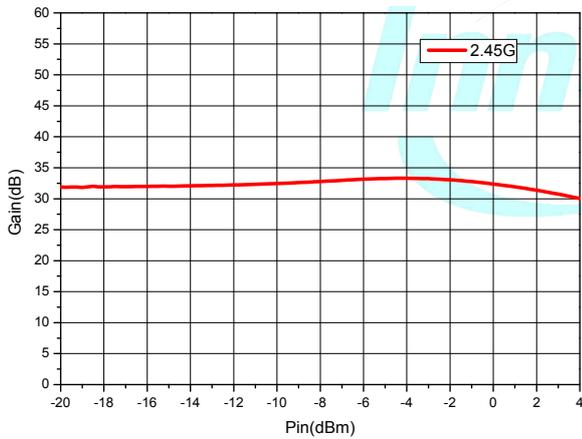
Gain & Return Loss



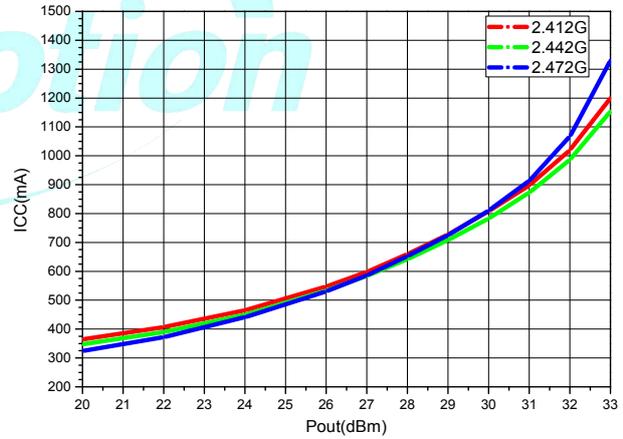
P1dB vs. Frequency



Power Gain vs. Input Power



ICC vs. Output Power

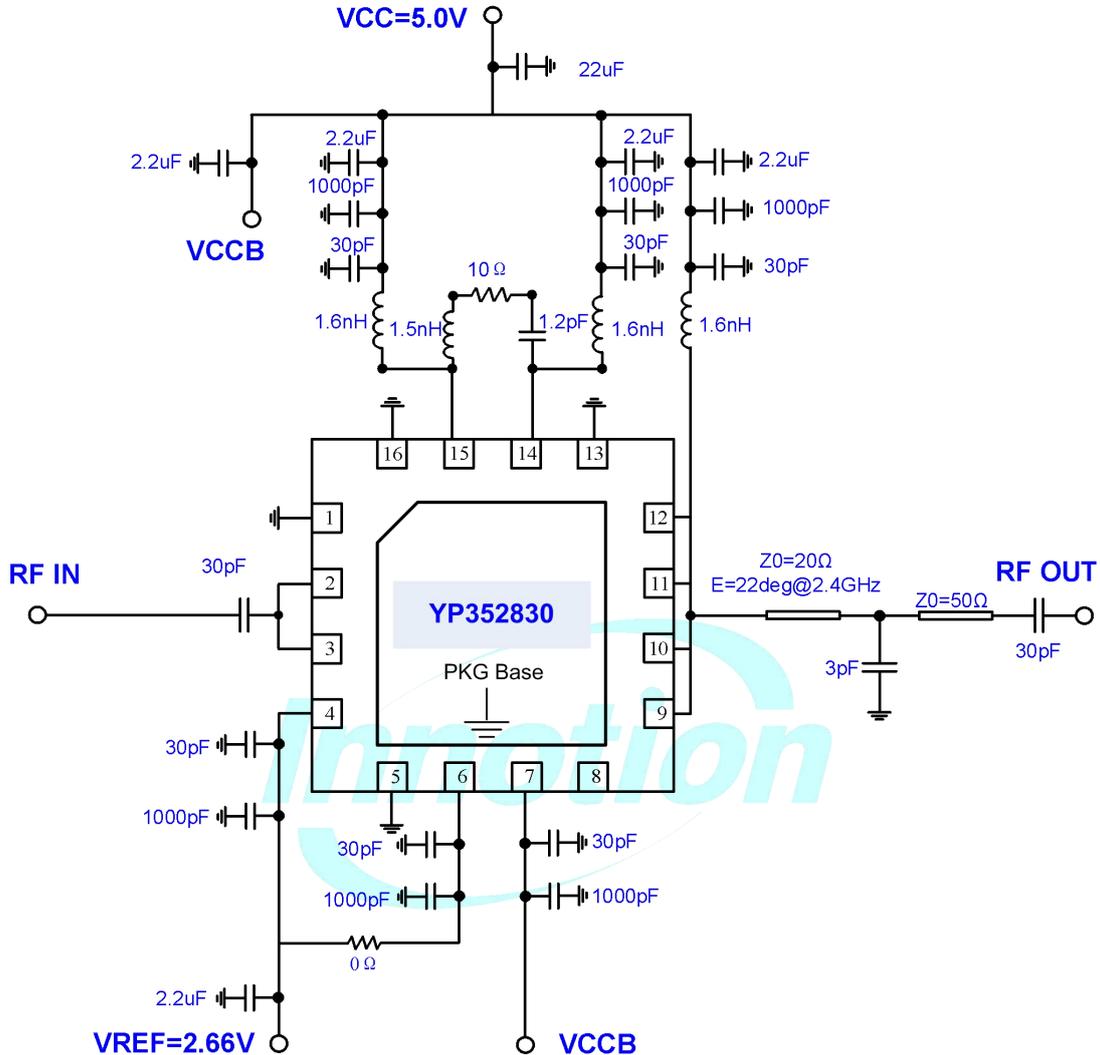


Note: Adjust VREF1 & VREF2 to achieve ICQ=210mA

Evaluation Board Schematic

(Frequency range: 2.4GHz-2.5GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=210mA(no RFin), T_{OP}=+25°C



Notes:

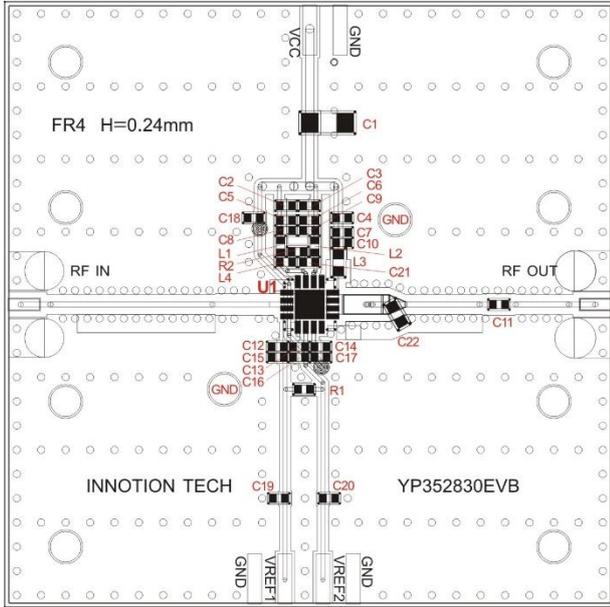
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2. Pin8 is active power detection port, if the function is not desired, this pin need to left unterminated (open).
3. Adjust VREF1 & VREF2 to achieve ICQ=210mA

Evaluation Board Layout

Board Size 50mm×50mm

Board Thickness 0.9mm, Board Material FR4, Multi-Layer

Evaluation Board View



Layer Details of DEMO Board

Cross Section	Name	Thickness	Material	εr
Via14	Top-Layer	1 oz	Cu	--
	Core 1	240um	FR-4	4.2
	Mid-Layer1	1 oz	Cu	--
			FR-4	4.2
	Mid-Layer2	1 oz	Cu	--
			FR-4	4.2
	Bottom-Layer	1oz	Cu	--



Circuit Component Designations and Values

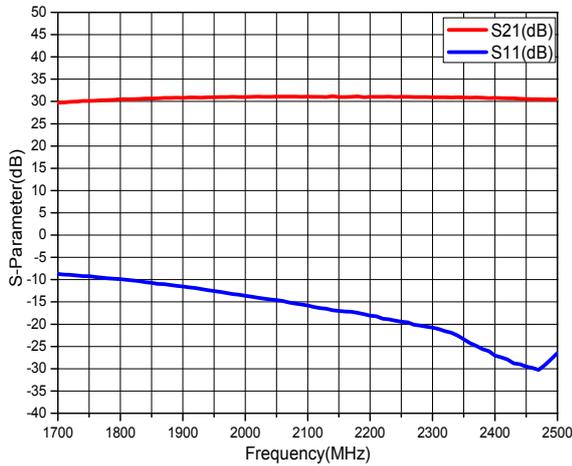
Component	Value	Manufacturer
C1	22uF	AVX
C2, C3, C4, C18, C19, C20	2.2uF	TDK
C5, C6, C7, C15, C16, C17	1000pF	TDK
C8, C9, C10, C11, C12, C13, C14	30pF	TDK
C21	1.2pF	TDK
C22	3pF	DLC
R2	10Ω	YAGEO
R1	0Ω	YAGEO
L4	1.5nH	TDK
L1, L2	1.6nH	TDK
L3	1.6nH	Coilcraft
U1	YP352830	Innotion

Typical Performance

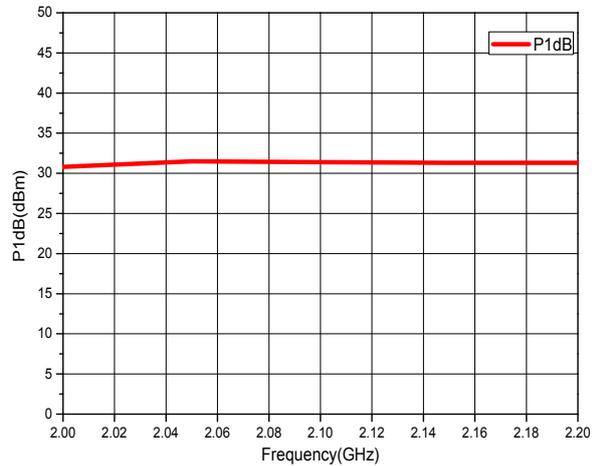
(Frequency range: 2.0GHz-2.2GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=210mA(no RFin), TOP=+25°C

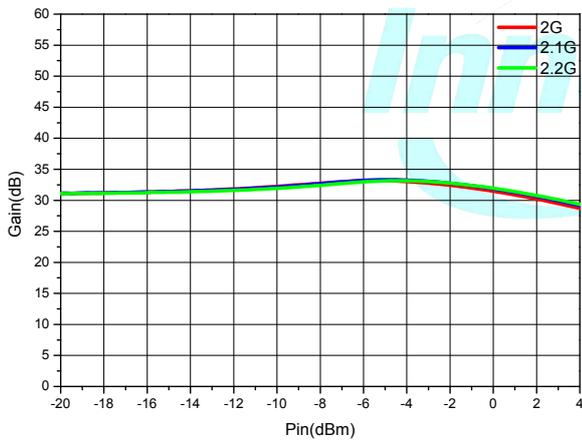
Gain & Return Loss



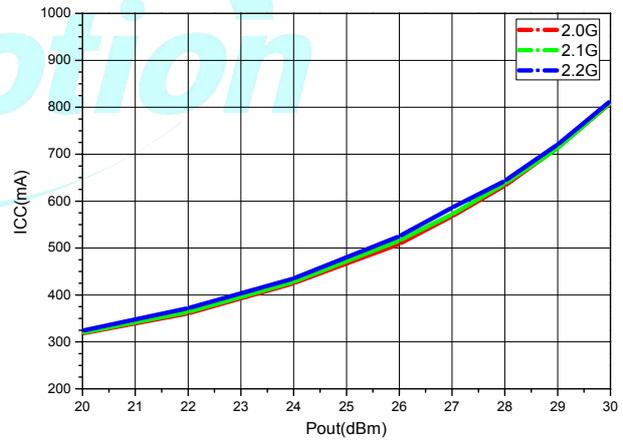
P1dB vs. Frequency



Power Gain vs. Input Power



ICC vs. Output Power

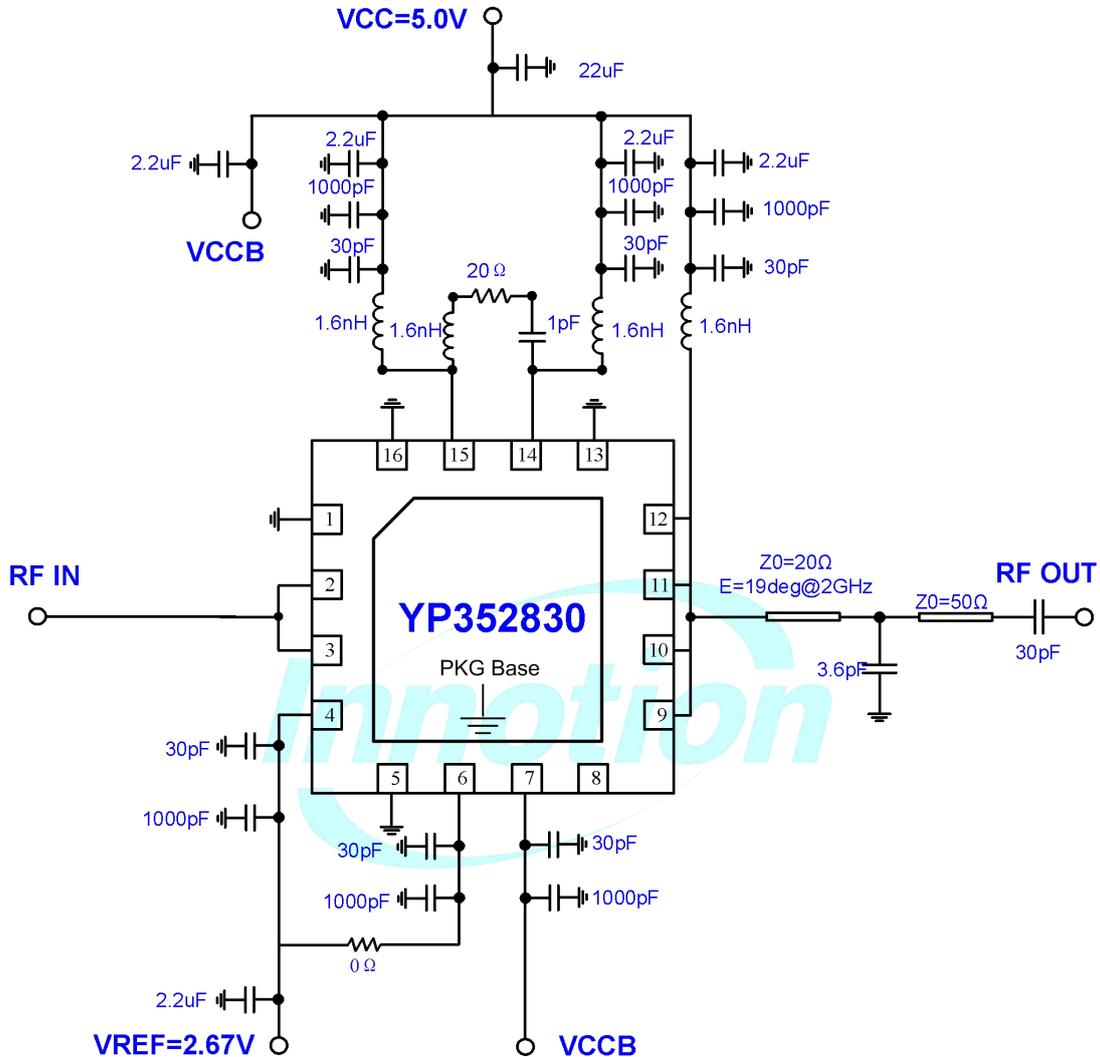


Note: Adjust VREF1 & VREF2 to achieve ICQ=210mA

Evaluation Board Schematic

(Frequency range: 2.0GHz-2.2GHz)

VCC1=VCC2=VCC3=VCCB=5V, ICQ=210mA(no RFin), T_{OP}=+25°C



Notes:

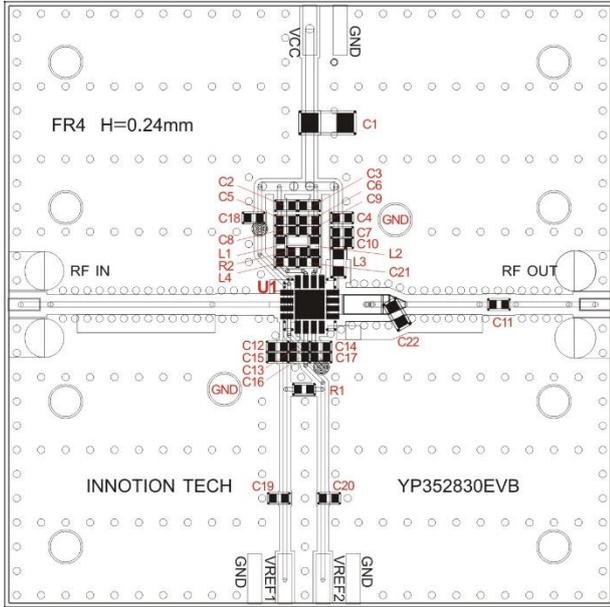
1. Pin5 is power down pin. Apply >2.5 V_{DC} to power off the PA. Apply 0 V_{DC} to power on. If the function is not desired, this pin may be connected to GND.
2. Pin8 is active power detection port, if the function is not desired, this pin need to left unterminated (open).
3. Note: Adjust VREF1 & VREF2 to achieve ICQ=210mA

Evaluation Board Layout

Board Size 50mm×50mm

Board Thickness 0.9mm, Board Material FR4, Multi-Layer

Evaluation Board View



Layer Details of DEMO Board

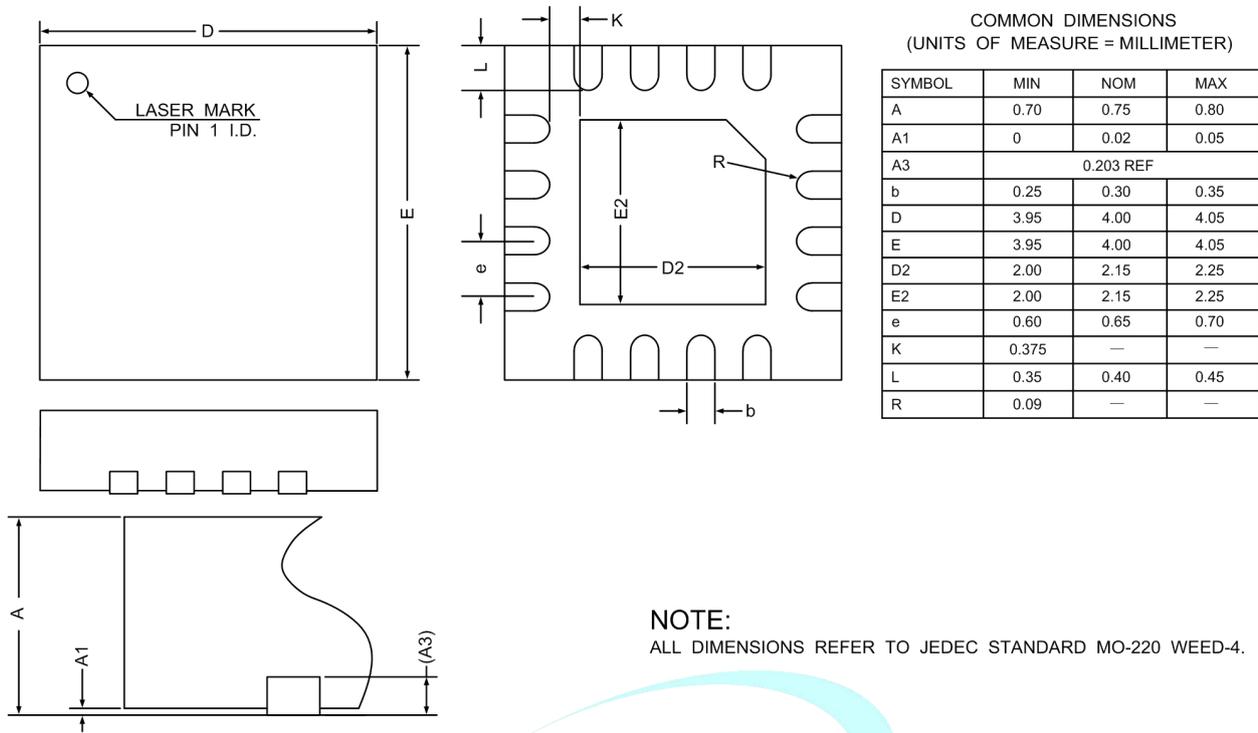
Cross Section	Name	Thickness	Material	ϵ_r
Via14	Top-Layer	1 oz	Cu	--
	Core 1	240um	FR-4	4.2
	Mid-Layer1	1 oz	Cu	--
			FR-4	4.2
	Mid-Layer2	1 oz	Cu	--
			FR-4	4.2
	Bottom-Layer	1oz	Cu	--



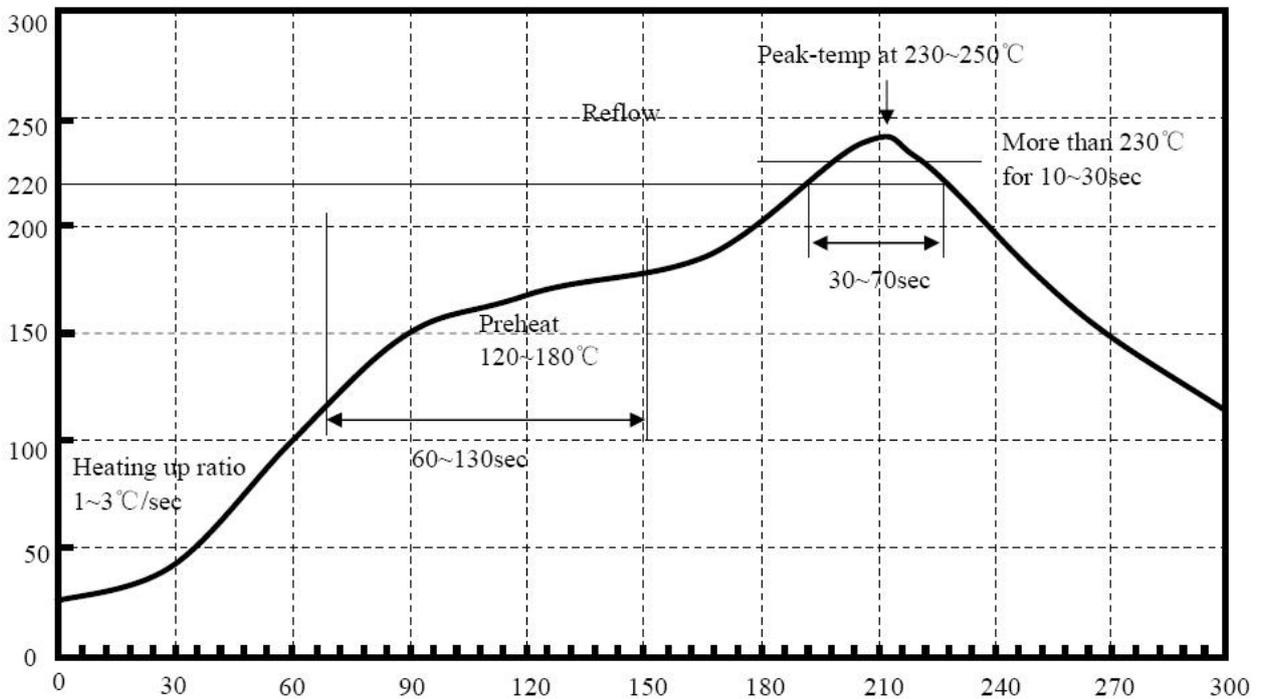
Circuit Component Designations and Values

Component	Value	Manufacturer
C1	22uF	AVX
C2, C3, C4, C18, C19, C20	2.2uF	TDK
C5, C6, C7, C15, C16, C17	1000pF	TDK
C8, C9, C10, C11, C12, C13, C14	30pF	TDK
C21	1pF	TDK
C22	3.6pF	DLC
R2	20 Ω	YAGEO
R1	0 Ω	YAGEO
L1, L2, L4	1.6nH	TDK
L3	1.6nH	Coilcraft
U1	YP352830	Innotion

Packaging Diagram



Recommended Solder Temperature



Recommended Temperature
Sn95.5Ag4.0Cu0.5