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Revised Date: November 1, 2006

# UP2268 Data Sheet (Preliminary)

UBEC Confidential  
Control # 2268

**Doc. #: DS-2268-01**  
**<Rev. 0.0>**

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**Revision History**

Revision	Date	Description of Change
0.0	November 10, 2006	Original.

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## 1 Product Description

The UP2268 is a RF front end IC integrating high-efficiency, linear power amplifier (PA), switch and low noise amplifier (LNA). Due to the ramp-control feature and a very low current consumption and high P1dB, UP2268 can be used under not only weak signal environment but also strong signal environment. UP2268 is designed for Bluetooth application in the 2.4 GHz ISM bands. The device is packaged in a miniaturized 3mmX3mm, 16 pin QFN with bottom ground.

## 2 Key Features

### ■ Single 3.3V supply (Power amplifier /PA)

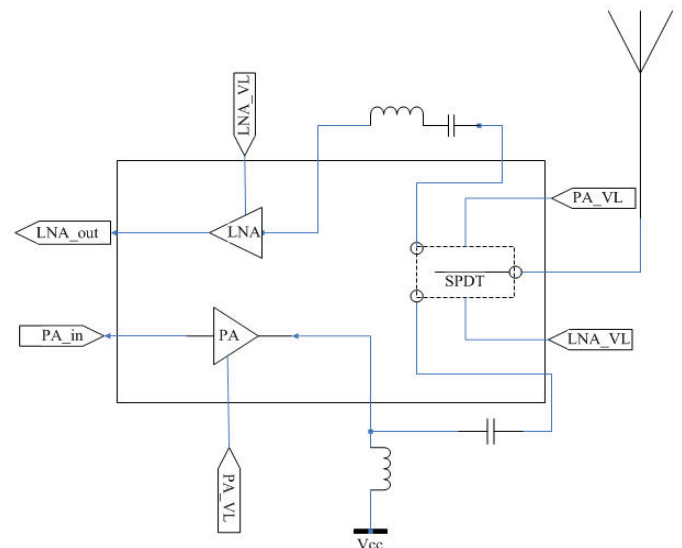
- 16.5 dBm P1dB output power
- Frequency range from 2.0 GHz to 3.0 GHz
- 13.5 dB linear gain
- 33% Efficiency at 12 dBm output power
- 2.6% EVM at 13 dBm output power for 802.11g, 54 Mbps, OFDM
- 18mA at 13dBm output power
- 50 ohm internally matched input

### ■ Single 3.3V supply (Low noise amplifier /LNA)

- 1.5 dBm input 1dB compression
- Frequency range from 2.0 GHz to 2.6 GHz
- 15 dB linear gain
- 1.5 dB noise figure
- Ramp-controlled LNA gain
- Low current consumption (Typical 6.5 mA )

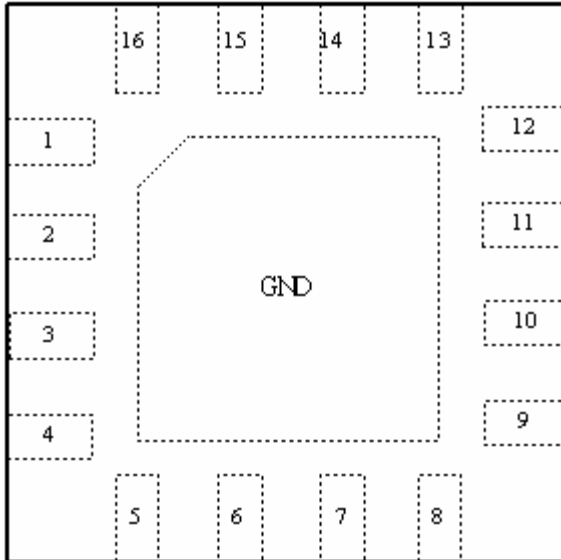
## 3 Applications

- Bluetooth
- 2.4 GHz ISM band
- 2.4 GHz wireless earphone



## 4 Pin Descriptions

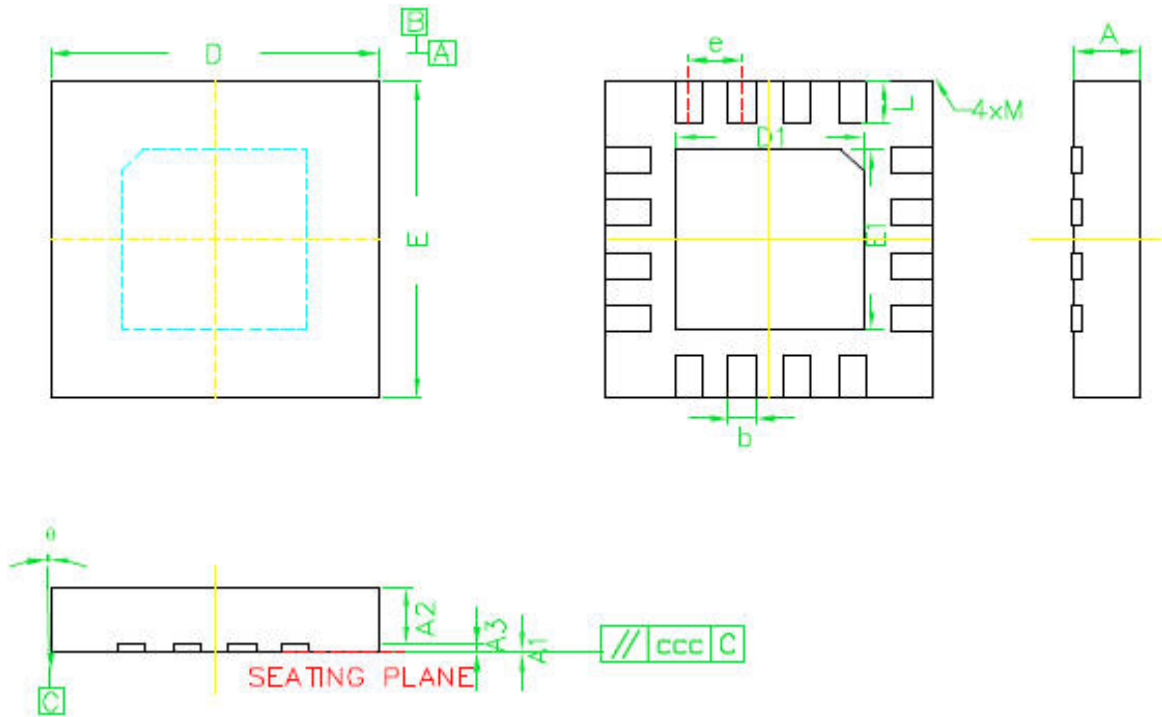
Top View



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Pin #	Name	Description
1	LNA_out	Power supply for LNA and LNA output
2	NC	Not connect
3	PA_in	PA input
4	PA_VL	Power control for PA
5	PA_Vb	Power supply for PA biasing stage
6,7	PA_Vcc	Power supply for PA and PA output
8	RF_PA	Power amplifier output
9	LNA_VL	Power control for switch RX mode
10	RF_ANT	RF out connect to antenna
11	PA_VL	Power control for switch TX mode
12	RF_LNA	LNA input
13	LNA_Vcc2	Power supply for LNA 2 <sup>nd</sup> stage
14	LNA_VL	Power control for LNA
15	LNA_Vb	Power supply for PA biasing stage
16	LNA_Vcc1	Power supply for LNA 1 <sup>st</sup> stage

**5 Package Specification**



Symbols	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	0.55	0.60.	0.65
A1	0	0.002	0.004
A2	0.51	0.54	0.59
A3	----	0.06REF.	----
b	0.20	0.25	0.30
D	2.95	3.00	3.03
D1	----	1.7BSC	----
E	2.95	3.00	3.03
E1	----	1.7BSC	----
e	----	0.50BSC	----
L	0.35	0.40	0.45
θ	-12	----	0
ccc	----	0.08	----
M	----	----	0.05
Burr	0.00	0.03	0.06

## 6 Absolute Maximum Ratings

Items	Value	Unit
Supply voltage	6	V
Power control voltage	3.5	V
RF input power	10	dBm
Operating case temperature	-30 to 80	°C
Storage temperature	-30 to 120	°C

## 7 Key Electrical Characteristics

Control Logic PA and LNA Switch

State	PA_VL	LNA_VL	RFout
1	'0'	'1'	TX
2	'1'	'0'	RX

PA\_VL, LNA\_VL: '0'=0 to +0.2V, '1'=+2.8 to +5V

### 7.1 Power Amplifier

\*PA\_Vcc,PA\_Vb,LNA\_Vcc,LNA\_Vb connected to 3.3V,PA\_VL connected to 3.3V,LNA\_VL connected to 0V

Items	Conditions	Min.	Typ.	Max.	Unit
Operating Supply Voltage		3.0	3.3	4.3	V
Frequency Range		2.0	----	3.0	GHz
Quiescent Current	at PA_VL = 3.3V	----	7	----	mA
Current Consumption	Pout=12dBm; Efficiency=33%	----	14	----	mA
Linear Gain		----	13.5	----	dB
Pout at 1dB Gain Compression		----	16.5	----	dBm
Input Return Loss		----	15	----	dB
Power Control - Enable		2.8	3.3	3.5	V
Power Control - Disable		----	----	0.5	V
Max. Power Control Current		----	----	1.5	mA
Power Down Current	PA_VL=0V	----	20	80	uA
Output Harmonics		----	-36	----	dBc
EVM	Pout=13 dBm (OFDM 64QAM 54Mbps), I=18mA Freq=2.4~2.5GHz)	2.4	2.6	3.0	%

## 7.2 Low-noise Amplifier

\* PA\_Vcc,PA\_Vb,LNA\_Vcc,LNA\_Vb connected to 3.3V,PA\_VL connected to 0V,LNA\_VL connected to 3.3V

Items	Conditions	Min.	Typ.	Max.	Unit
Operating Power Supply Voltage		3.0	3.3	4.3	V
Frequency Range		2.0	----	2.6	GHz
Quiescent Current	LNA_VL= 3.3V	----	6.5	----	mA
Linear Gain	LNA_VL= 3.3V	----	15	----	dB
P <sub>in</sub> at 1dB Gain Compression		----	1.5	----	dBm
Input Return Loss		----	9	----	dB
Power Control - Enable		2.8	3.3	3.5	V
Power Control - Disable		----	----	0.5	V
Max. Power Control Current		----	----	1.5	mA
Power Down Current	LNA_VL =0V	----	20	80	uA



Caution: ESD sensitive.

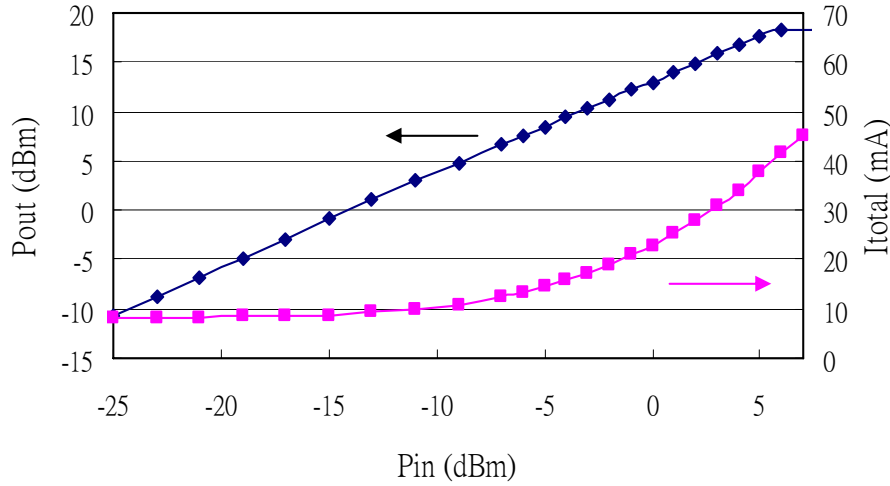


## 8 Performance Data

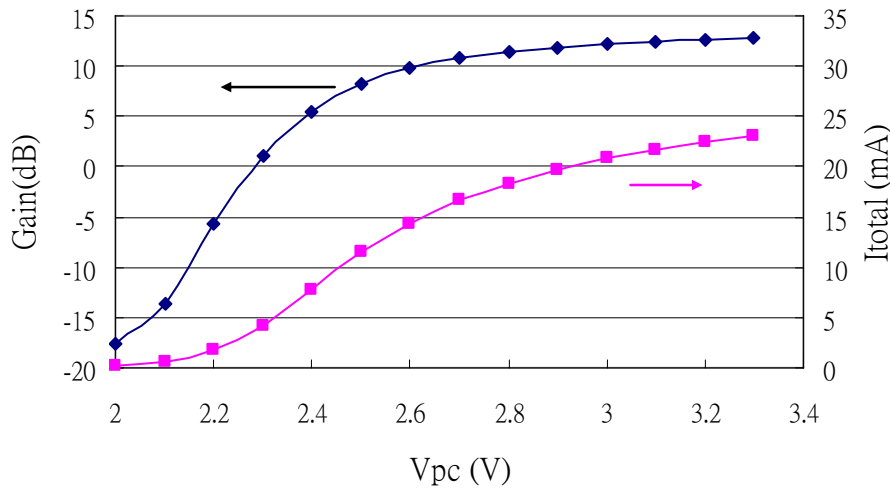
### 8.1 Transmit Chain

\* PA\_Vcc, PA\_Vb, PA\_VL are connected to 3.3V, LNA\_VL connected to 0V; T=25°C

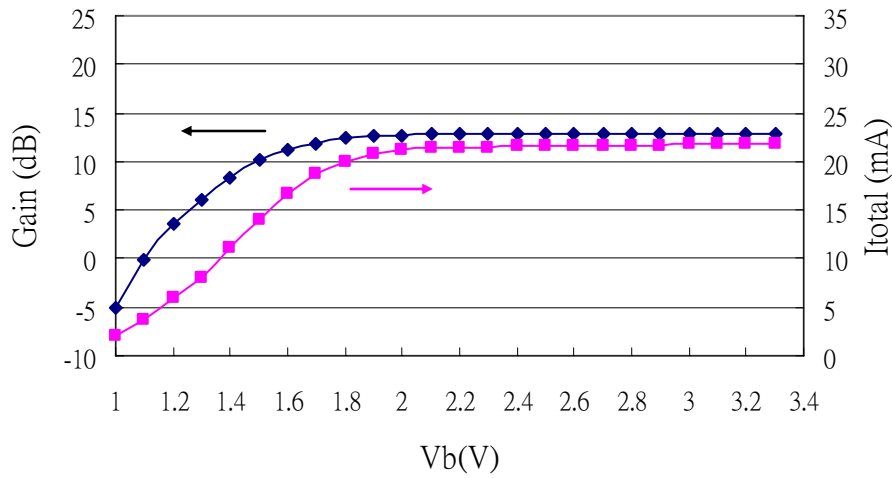
Output Power and Current vs. Input Power at 2.45GHz



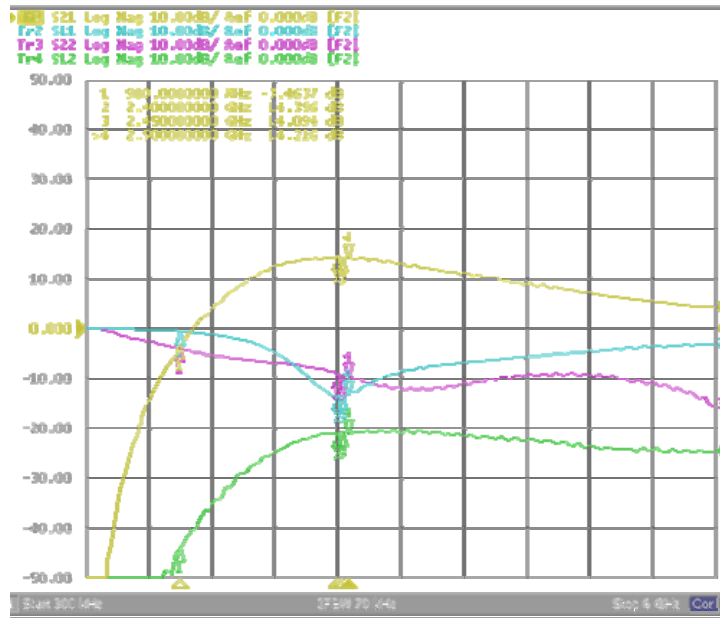
Gain@I/P=0dBm and Current vs. PA\_VL at 2.45GHz



Gain@I/P=0dBm and Current vs. PA\_Vb at 2.45GHz



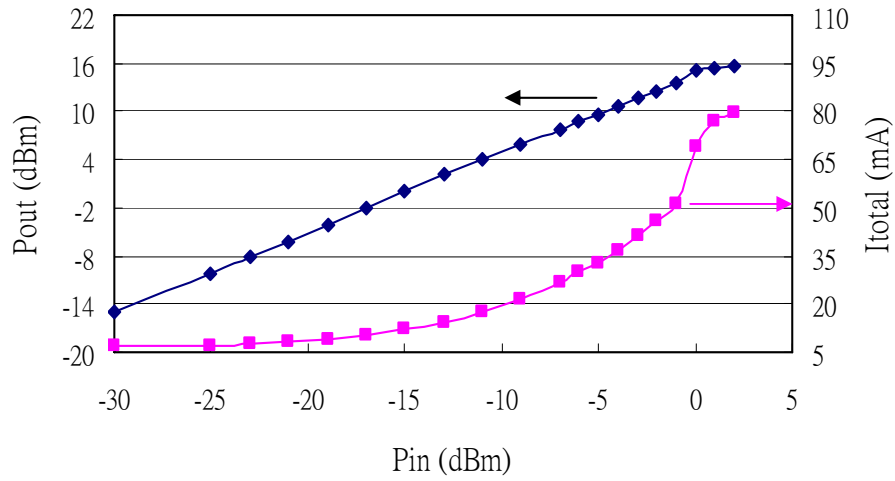
PA S-parameter Measurement



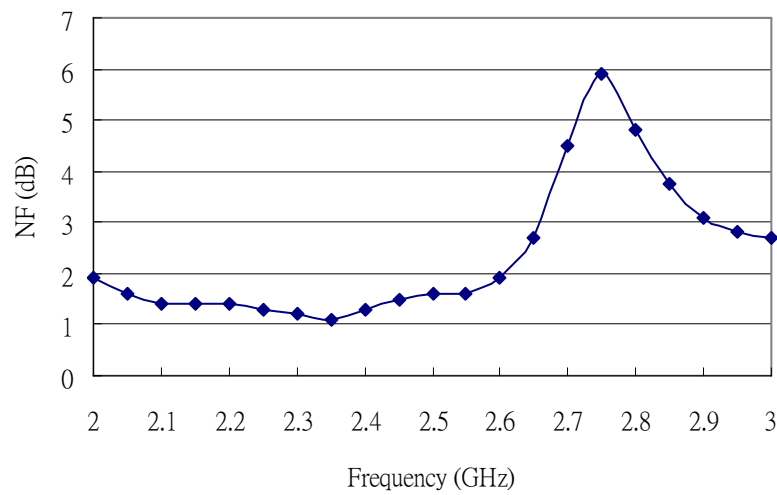
### 8.2 Receiver Chain

\* LNA\_Vcc, LNA\_Vb, LNA\_VL are connected to 3.3 V; T=25°C

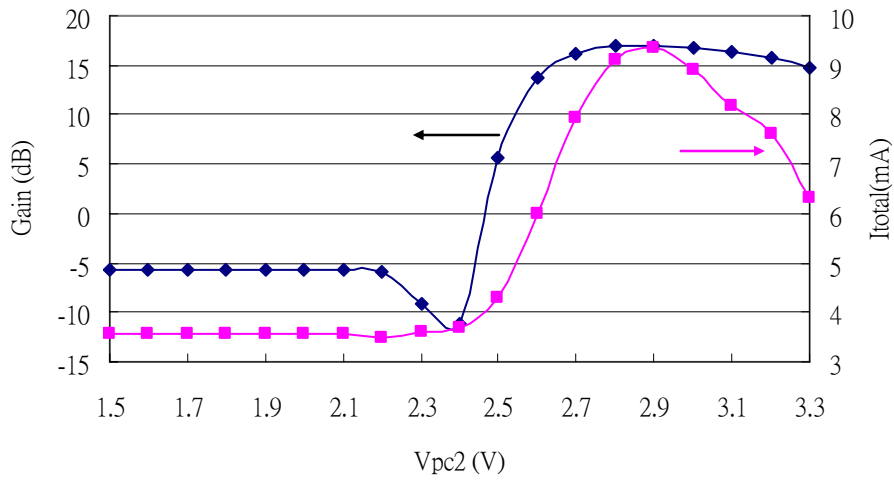
Output Power and Current vs. Input Power at 2.45GHz



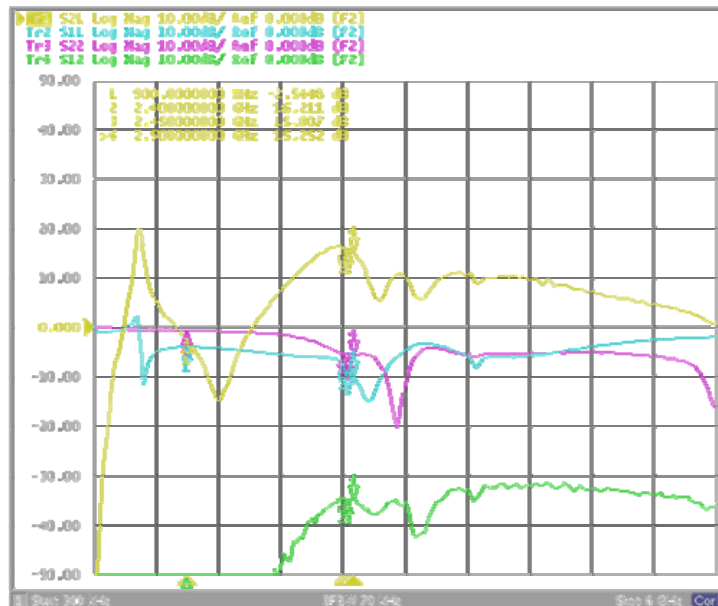
Noise Figure vs. Frequency



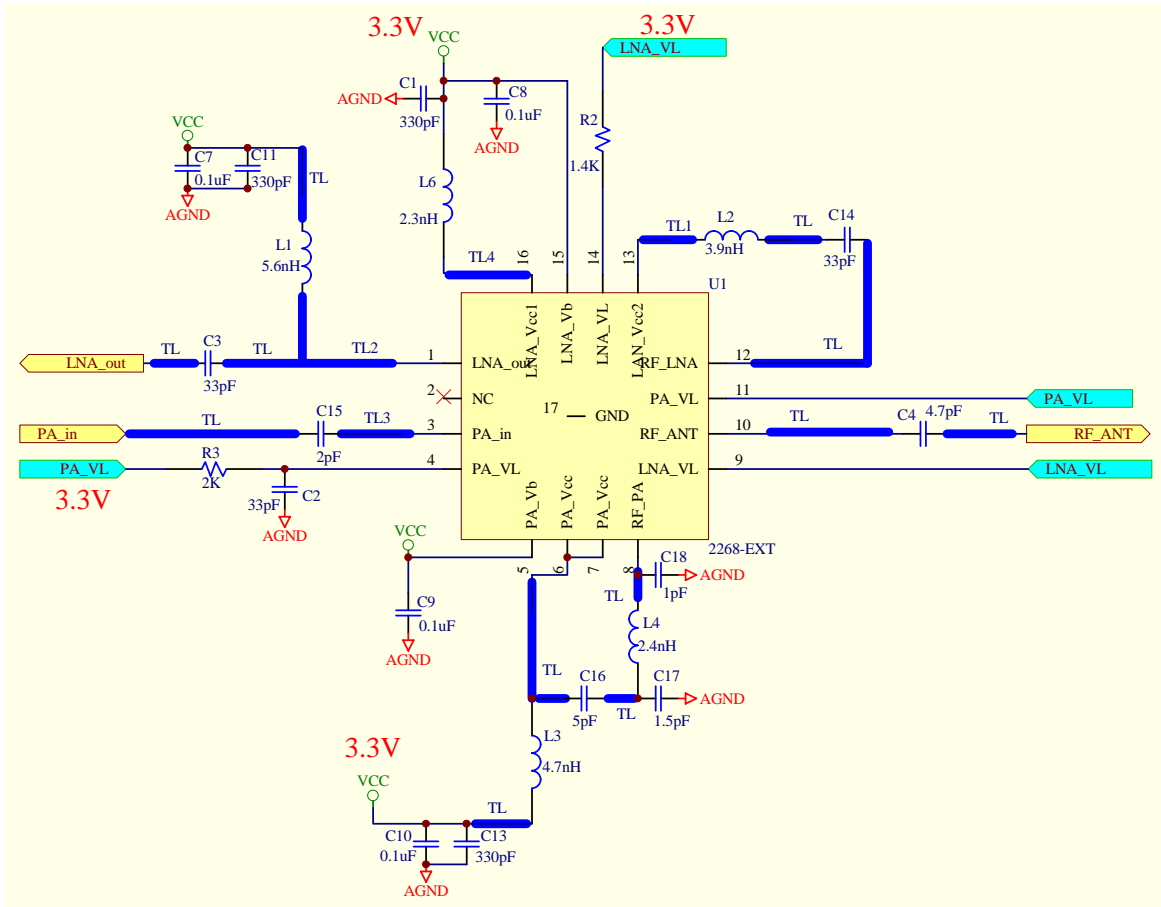
Gain and Current vs. LNA\_VL at 2.45GHz



LNA S-parameter Measurement



**9 Typical Application Circuit**



All TL are 50 ohm lines

	TL1	TL2	TL3	TL4
Length (mil)	30~40	75~55	24~34	<10

\* Note 1: all lengths are measured from edge to edge.

\* Note 2: C12 must to be put as closed as to Pin14