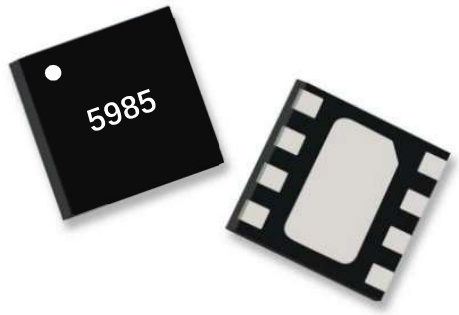
TC5985

5.9-8.5 GHz Low Noise Amplifier



Description

The TC5985 is a general purpose low noise amplifier (LNA) that operates in the 5.9GHz~8.5GHz frequency range. The device incorporates on-chip in/output matching circuits and is fabricated with GaAs PHEMT process. Its industry-leading noise figure, together with high linearity, makes it ideal as a first stage LNA.

The TC5985 is provided in a 2x2 mm, 8 pin QFN package.

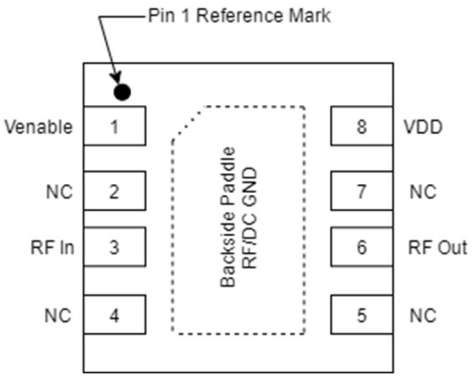
Features

- Ultra-low Noise Figure
- 5.9 GHz to 8.5 GHz operation
- Enable/disable mode
- High IIP3
- High gain
- QFN (8-pin, 2 x 2 mm) package

Applications

- Notebooks, netbooks, and tablets
- Access points, routers, and gateways
- Wireless video systems

Functional Block Diagram



Ordering Information

- TC5985

Recommended Operating Conditions

Parameter	Units	Min	Typ	Max
Supply Voltage (VDD、Venable)	V	+4.75	+5	+5.25
Operational Frequency Range	GHz	5.9		8.5
Operating Temperature	℃	-40		+85

Absolute Maximum Ratings

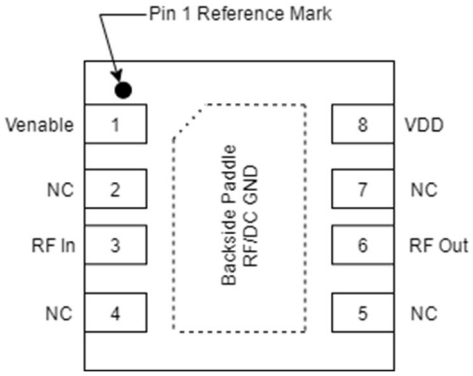
Parameter		Units	Min	Typ	Max
Device Voltage (VDD、Venable)		V	0		5.5
RF Input Power (Pin), CW, 50ohms, T=25℃		dBm			25
Storage Temperature		℃	-65		+150
ESD Rating	HBM	V		1000	
	CDM	V		1000	

Electrical Specifications

Test Conditions: VDD=Venable = +5.0V, Temp=+25 °C

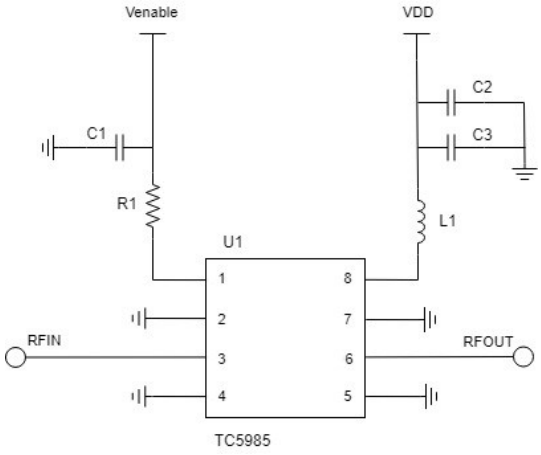
Parameter	Conditions	Units	Min	Typ	Max
Operational Frequency Range		MHz	5900		8500
Gain	7100M	dB		16.0	
Input Return Loss	7100M	dB		13.4	
Output Return Loss	7100M	dB		13.4	
Reverse Isolation	7100M	dB		30.8	
Output P1dB	7100M	dBm		14.9	
IIP3	Pin=-25dBm/tone, Δf=1 MHz, 7100M	dBm		11.0	
Noise Figure	7100M	dB		1.14	
Drain Current	VENABLE = 5V	mA		16	

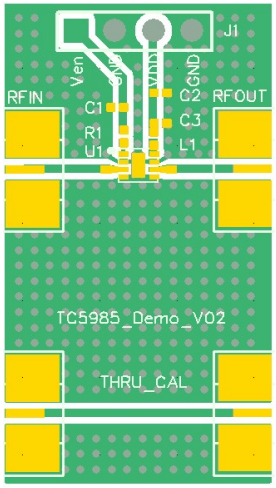
Pin Assignments and Description



Pin	Name	Description
2,4,5,7	NC	No electrical connection internally.
1	Venable	Sets the quiescent current of the LNA.
3	RF In	RF input.
6	RF Out	RF output.
8	VDD	LNA supply voltage
Backside Paddle	GND	RF/DC ground connection.

PCB Evaluation Board





Evaluation Board BOM

Reference Des.	Conditions	Value	Manuf.	Part Num.
PCB	N/A	N/A	SDSX	TC5985_Demo_V02
U1	N/A	N/A	SDSX	TC5985
R1	N/A	1.5kohm	Various	0402
C1	N/A	1uF	murata	0402
C2	N/A	4.7uF	murata	0402
C3	N/A	100nF	murata	0402
RFIN、RFOUT	N/A	N/A	NanJing AoWen	D550B12E01-048

Note：C1 may be not necessary in target application.

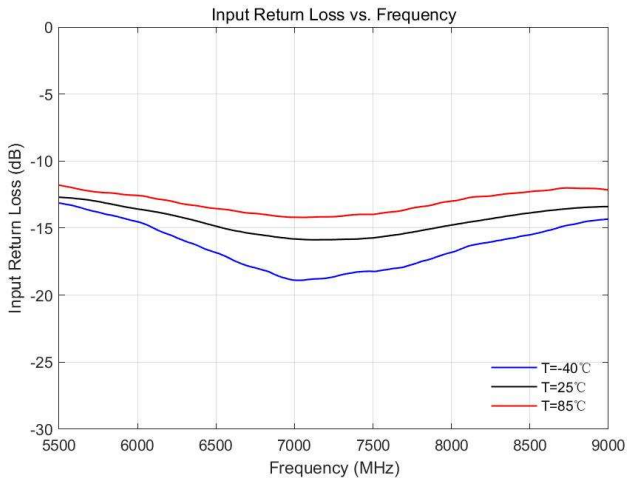
Typical Performance

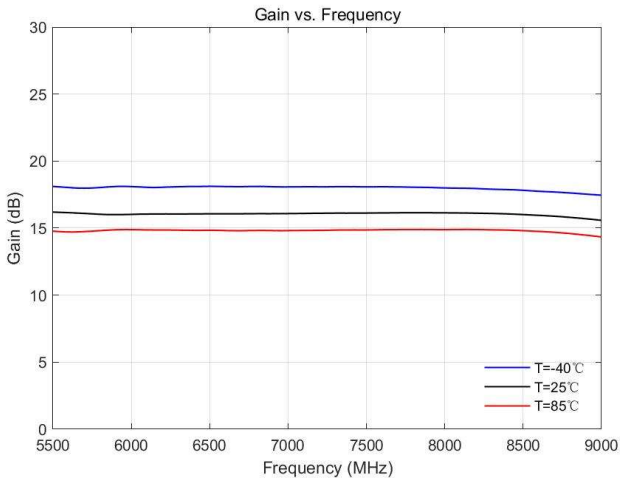
Test Conditions: VDD=Venable = +5.0V, Temp=+25 °C

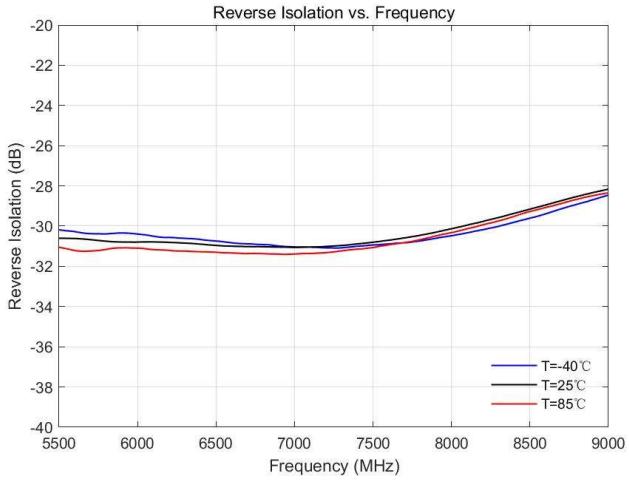
Parameter	Conditions	Units	Typical					
Frequency		MHz	5900	6500	7100	7500	8000	8500
Gain		dB	16.0	16.1	16.1	16.3	16.2	16.0
Input Return Loss		dB	13.4	14.8	15.8	15.8	14.8	13.9
Output Return Loss		dB	11.2	10.0	9.2	9.0	9.1	10.1
Reverse Isolation		dBm	30	31	31	30	29	29
Output P1dB	Pin=-25dBm/tone, Δf=1 MHz, 7200M	dBm	14.5	14.2	13.3	12.2	12.1	10.3
IIP3		dBm	11.0	13.3	12.2	9.5	9.7	7.5
Noise Figure		dB	1.14	1.23	1.18	1.25	1.28	1.32

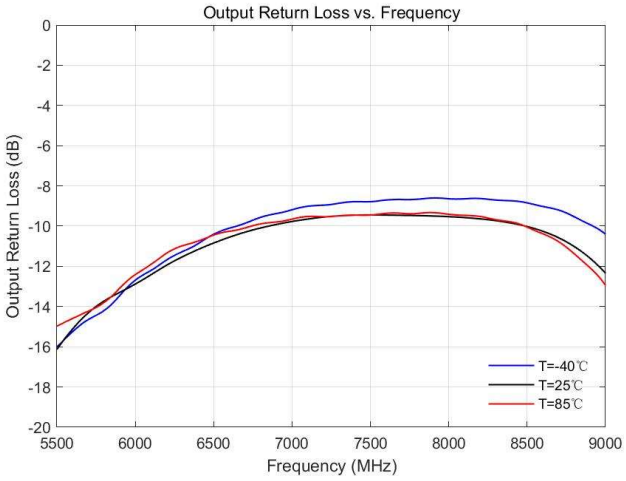
Performance Plots

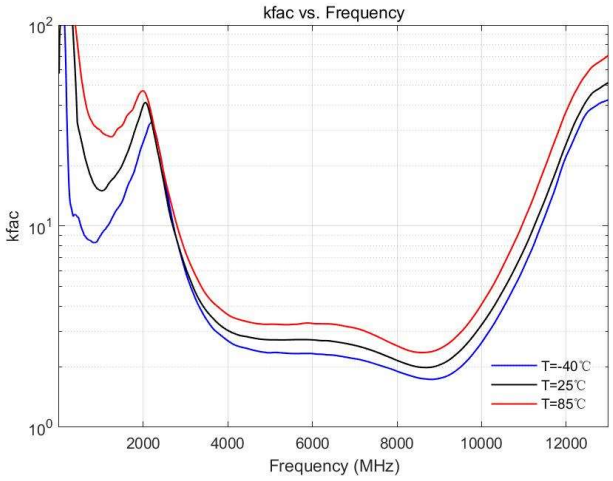
Test Conditions: VDD=Venable = +5.0V

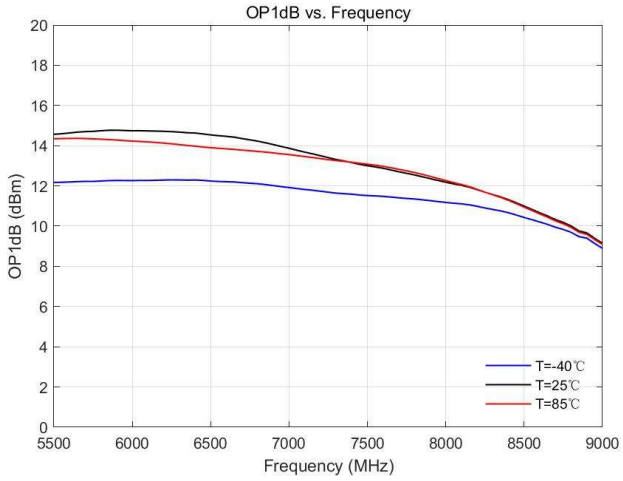


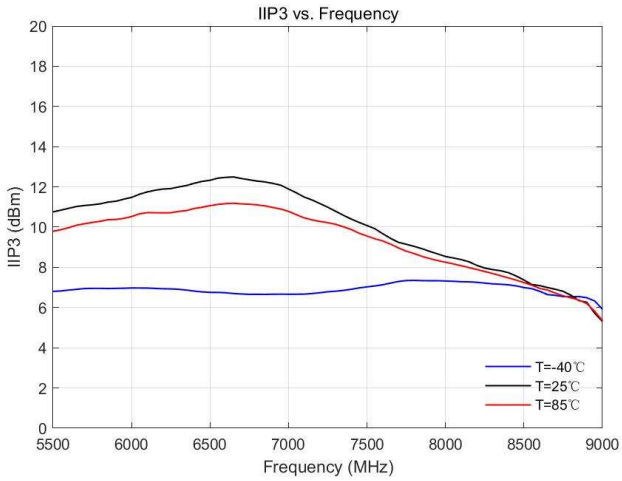


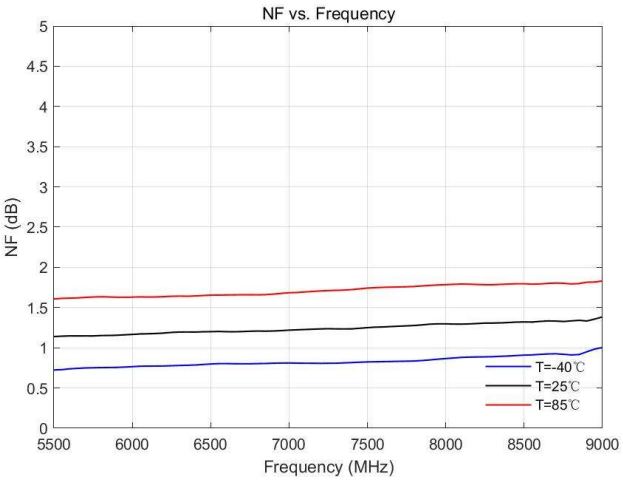





kfac vs. Frequency
kfac
Frequency (MHz)
T=-40℃
T=25℃
T=85℃


OP1dB vs. Frequency
OP1dB (dBm)
Frequency (MHz)
T=-40℃
T=25℃
T=85℃

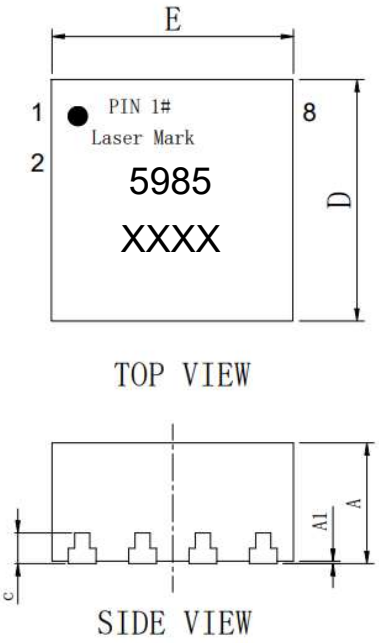

IIP3 vs. Frequency
IIP3 (dBm)
Frequency (MHz)
T=-40℃
T=25℃
T=85℃

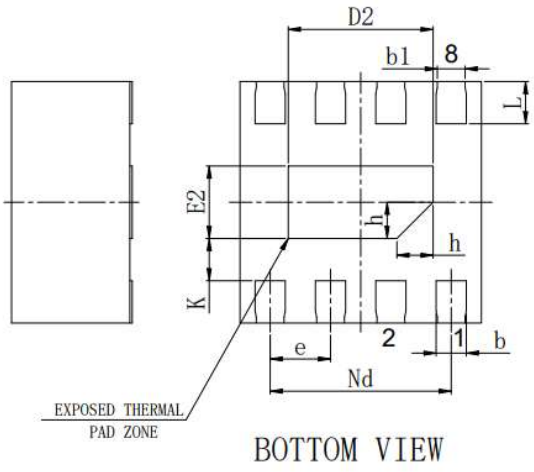

NF vs. Frequency
NF (dB)
Frequency (MHz)
T=-40℃
T=25℃
T=85℃

Package Marking and Dimensions

Marking: Part number – 5985

Lot code – XXXX





SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.95	1.00	1.05
A1	0	0.02	0.05
b	0.20	0.25	0.30
b1		0.23REF	
c		0.254REF	
D	1.90	2.00	2.10
D2	1.10	1.20	1.30
e		0.50BSC	
Nd		1.50BSC	
E	1.90	2.00	2.10
E2	0.50	0.60	0.70
L	0.30	0.35	0.40
h	0.25	0.30	0.35
K		0.35REF	

Notes: 1. All dimensions are in millimeters.

2. Coplanarity applies to the exposed heat sink slug as well as the terminals.

3. DFN 8 pin 2x2x1mm Package.

Handling Precaution

ESD countermeasure methods should be developed and used to control potential ESD damage during handling in a factory environment at each manufacturing site.

Solderability

Compatible with lead-free (260 ℃ maximum reflow temperature) soldering processes.

RoHS Compliance

This product is compliant with the EU RoHs2.0, EU Directive 2015/863.

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