

PNH15

High Linearity InGaP HBT Amplifier



Features

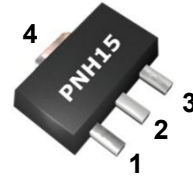
- 5 - 3000MHz
- 15.5 dB Gain at 1900MHz
- +23.5 dBm P1dB
- 40 dBm Output IP3
- Single 5V Supply Voltage
- Supply Current 78mA
- Lead-free / Green / RoHS-compliant SOT-89 Package



Applications

- Mobile Infrastructure
- Cellular, GSM
- PCS, WCDMA, WiBro, WiMax
- W-LAN / ISM
- RFID / Fixed Wireless

Functional Diagram



Function	Pin No.
RF IN	1
RF OUT / Bias	3
Ground	2,4

Description

The PNH15 is a high performance InGaP HBT MMIC Amplifier and high linearity driver amplifier in a high quality SOT-89 package. The device features excellent Input and output return loss, highly linear performance. The device can be easily matched to obtain optimum power and linearity. The product is targeted for use as driver amplifier for wireless infrastructure applications. The PNH15 operates from a single +5.0 voltage supply and has an internal active bias.

All devices are 100% RF and DC tested.

Specifications

Symbol	Units	Freq.	Min.	Typ.	Max.
S21	dB	900 MHz	20	20.5	22
		1900 MHz	15	15.5	17
		2600 MHz	12	13.0	14
S11	dB	900 MHz		-15	
		1900 MHz		-15	
		2600 MHz		-13	
S22	dB	900 MHz		-9.5	
		1900 MHz		-11	
		2600 MHz		-20	
P1dB	dBm	900 MHz		23.4	
		1900 MHz		23.6	
		2600 MHz		23.5	
OIP3	dBm	900 MHz 1900 MHz 2600 MHz	39	40 40 40	
NF	dB	900 MHz		3.9	
		1900 MHz		3.6	
		2600 MHz		4.0	
I _{cc}	mA		68	78	88
V _{cc}	V			5.0	
R _{th}	°C/W			38	

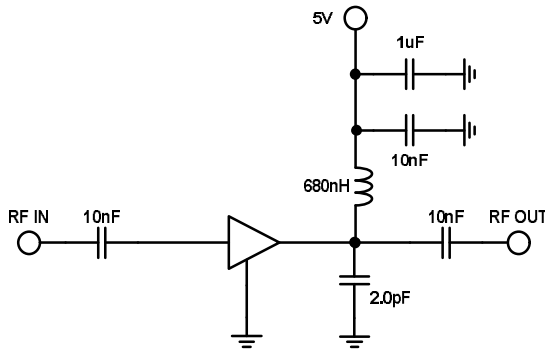
Test Conditions : T=25°C, Supply Voltage=+5V, 50ohm System, OIP3 measured with two tones at an output power of +9dBm/tone separated by 1MHz.

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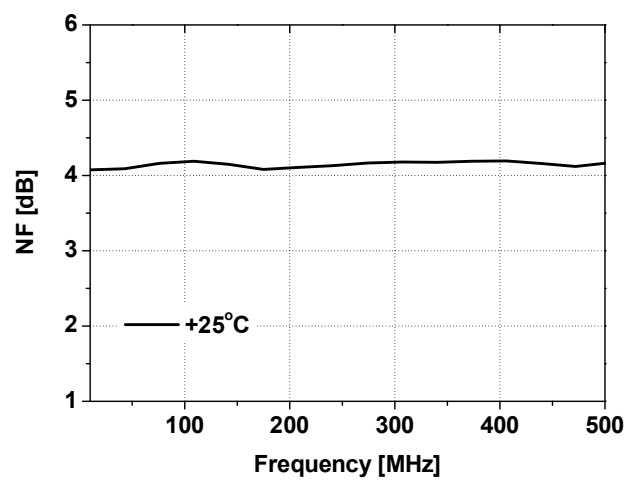
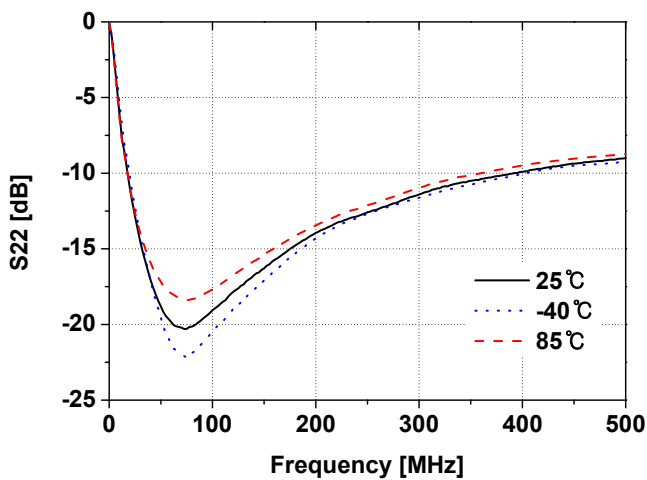
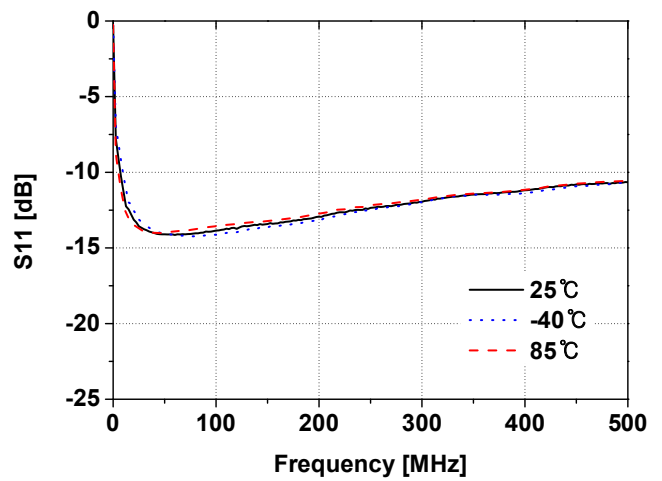
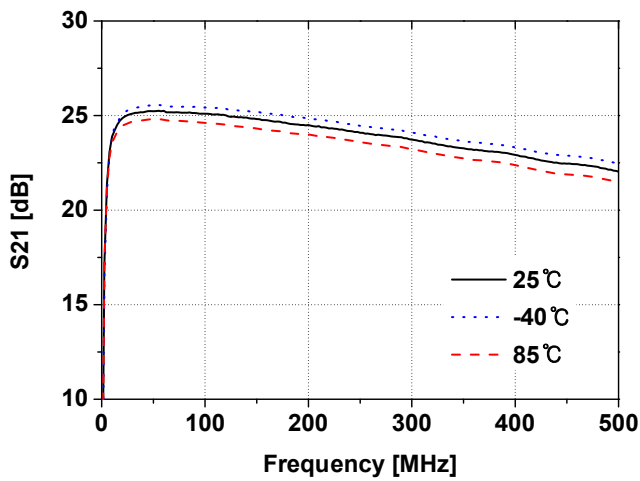
High Linearity InGaP HBT Amplifier



Typical RF Performance for 70MHz Tuned Application Circuit

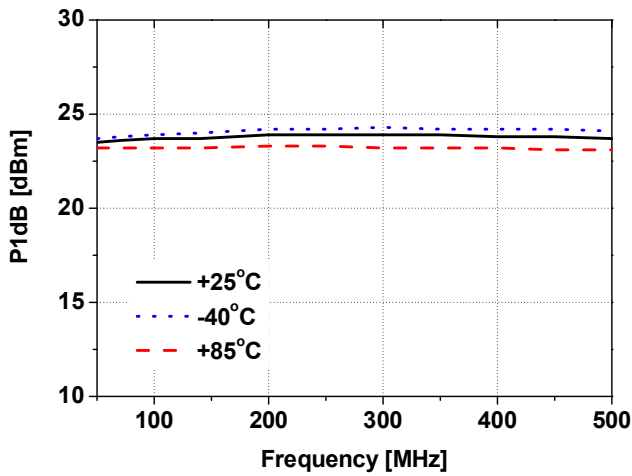
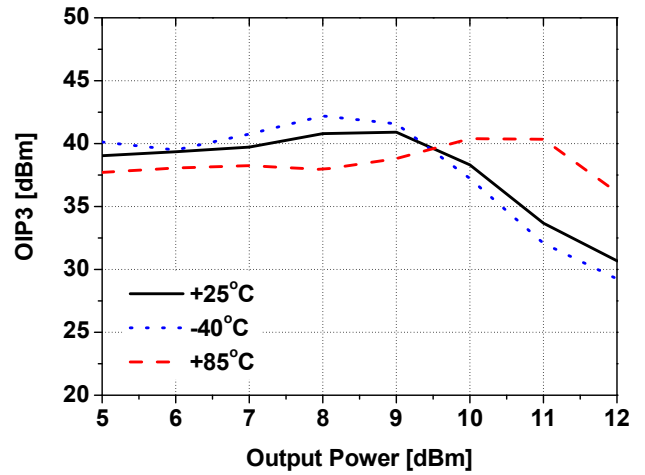
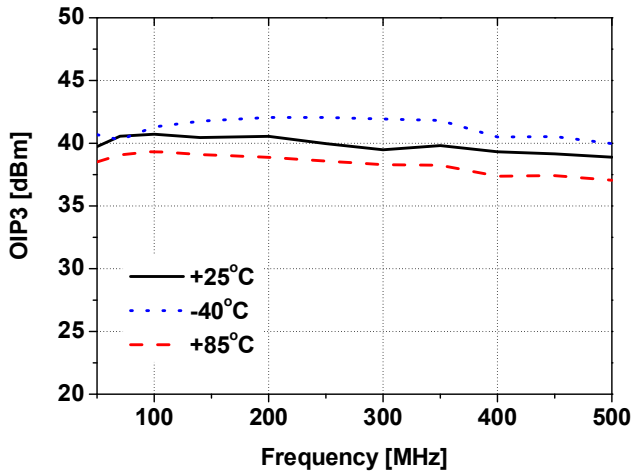


Frequency	70 MHz
S21	25.0dB
S11	-13.0 dB
S22	-18.0 dB
P1dB	+23.4 dBm
Output IP3 @9dBm	+41.3 dBm
NF	4.1 dB
Vcc	5 V
Icc	78 mA



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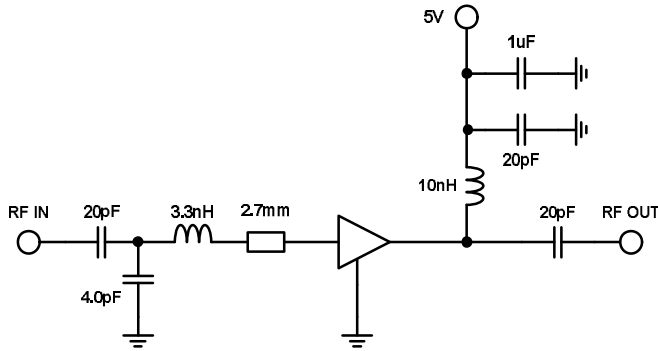


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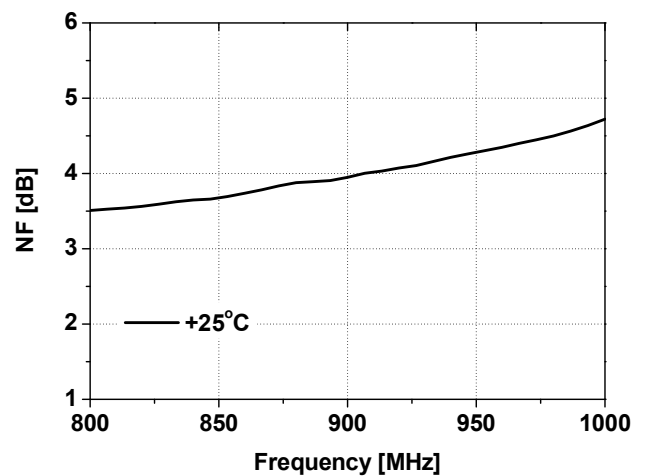
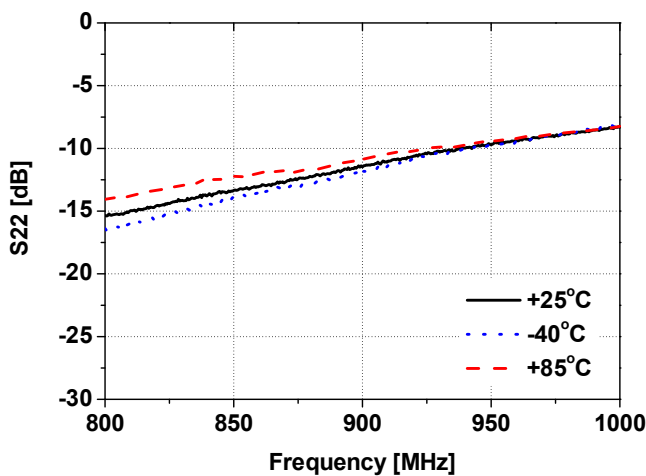
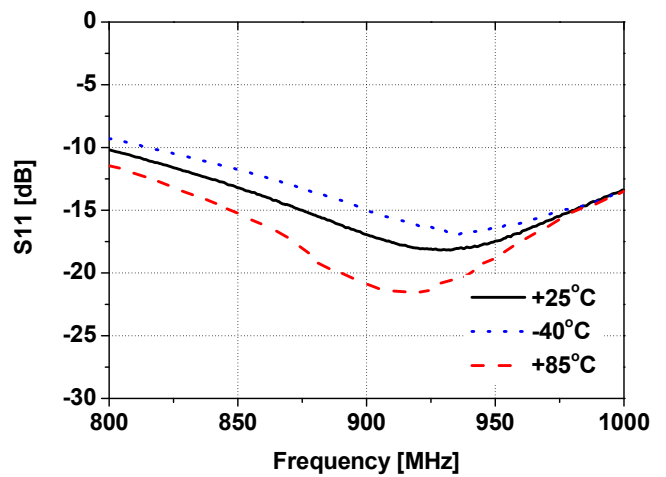
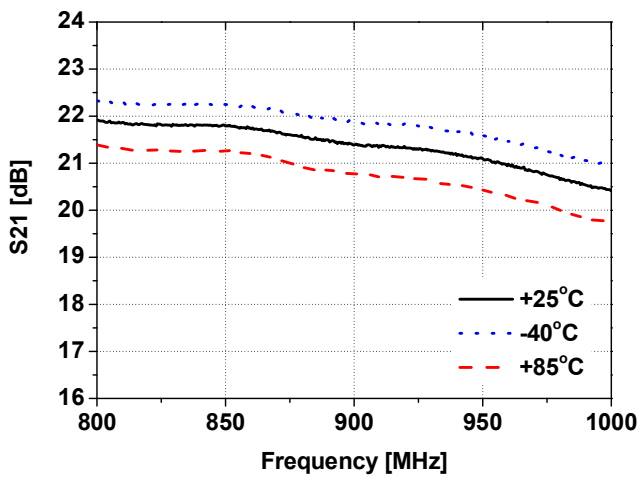
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Typical RF Performance for 900MHz Tuned Application Circuit

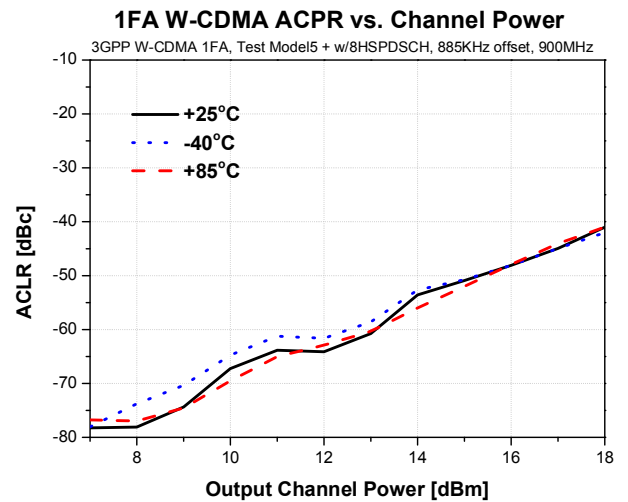
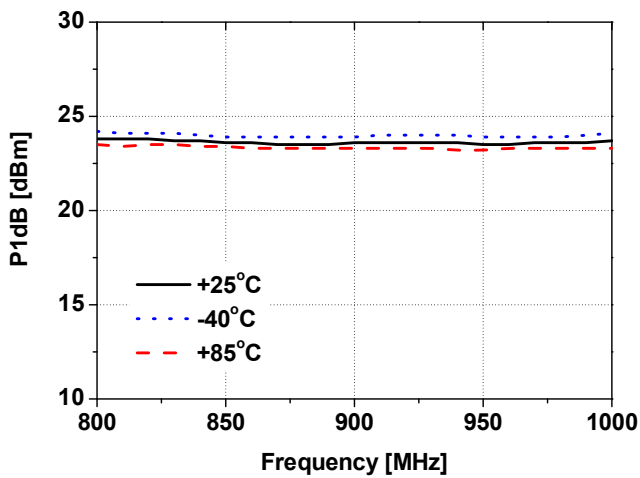
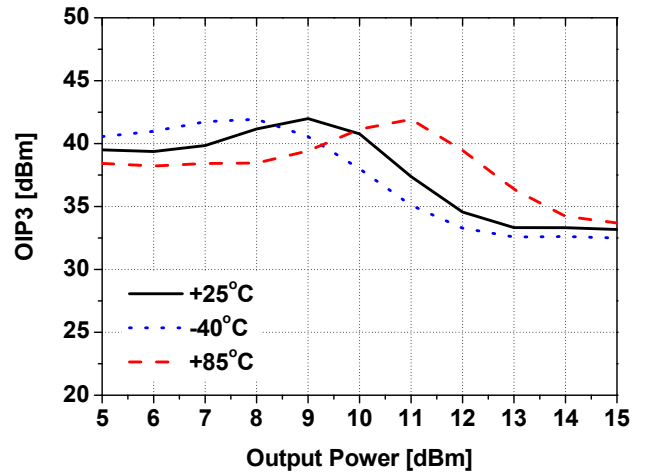
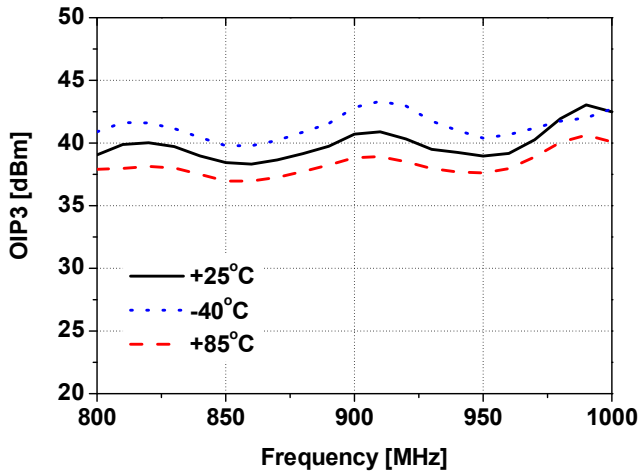


Frequency	900 MHz
S21	21.1dB
S11	-15.9 dB
S22	-10.4 dB
P1dB	+23.4 dBm
Output IP3 @8dBm	+40.4 dBm
NF	3.9 dB
Vcc	5 V
Icc	78 mA



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High Linearity InGaP HBT Amplifier

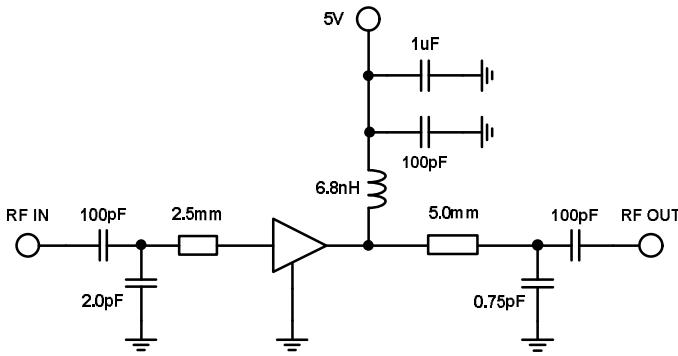


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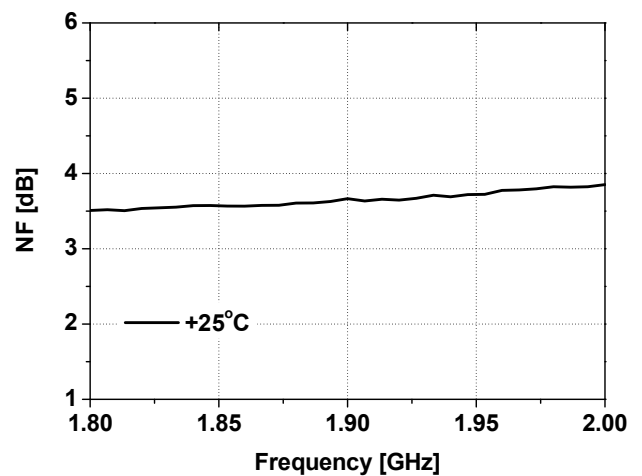
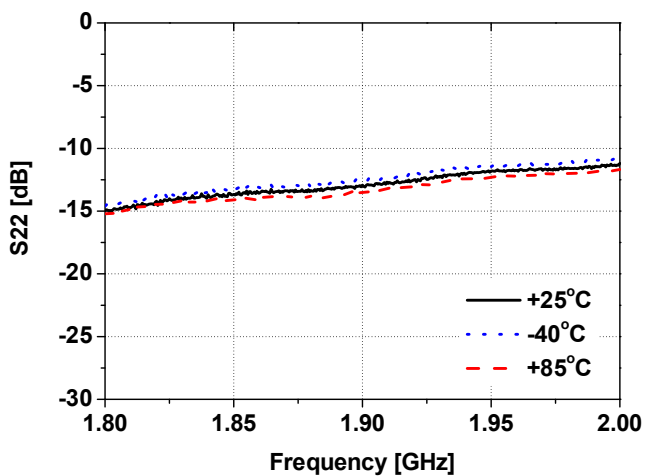
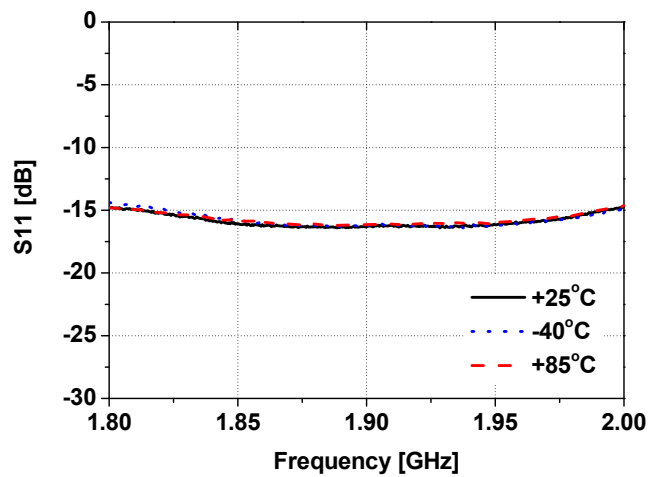
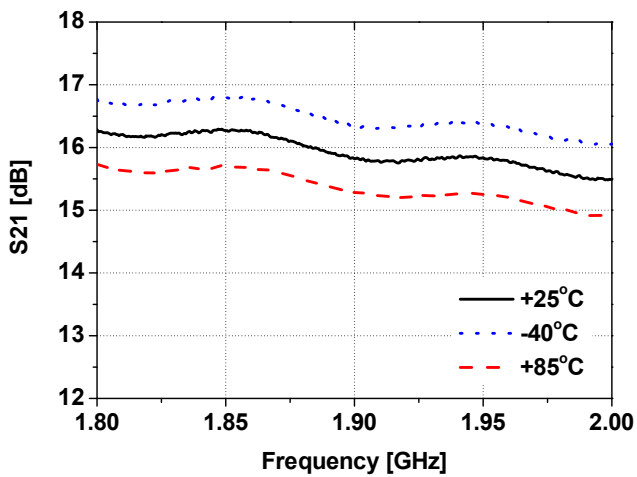
High Linearity InGaP HBT Amplifier



Typical RF Performance for 1900MHz Tuned Application Circuit

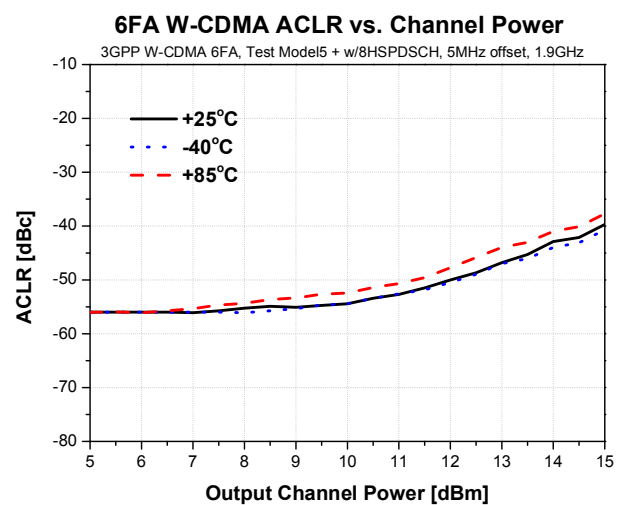
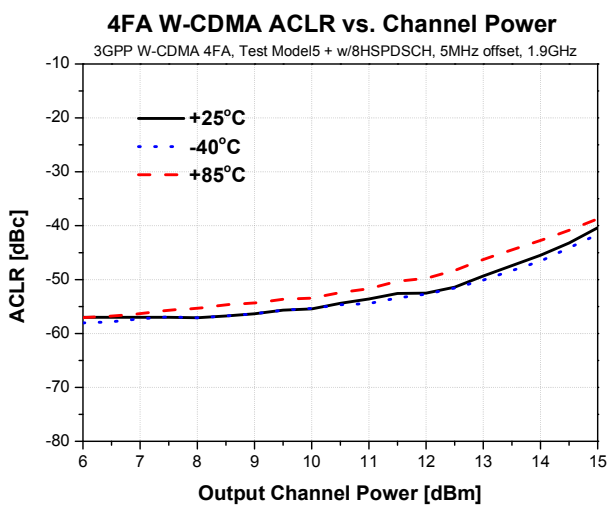
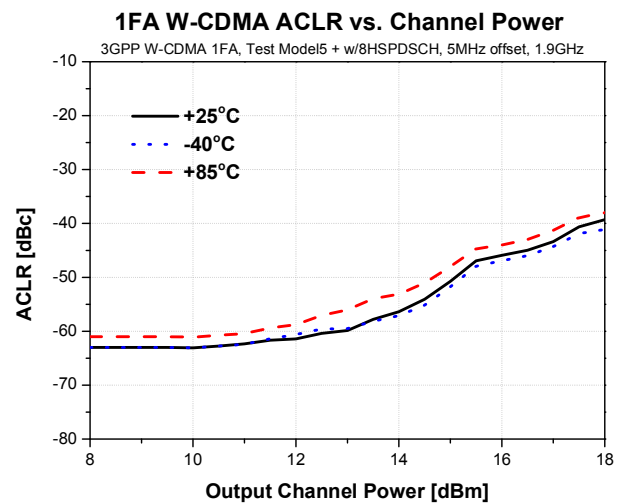
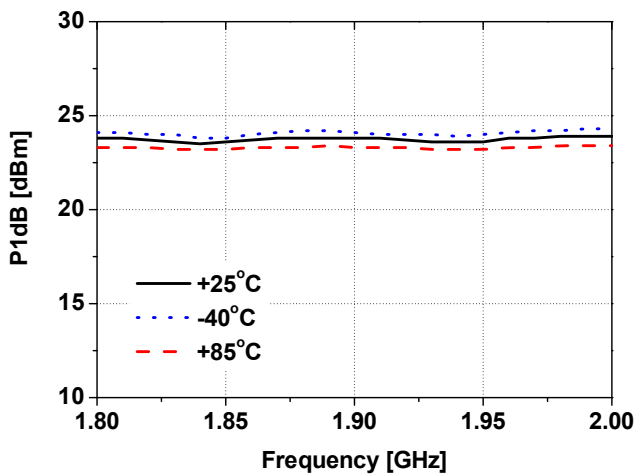
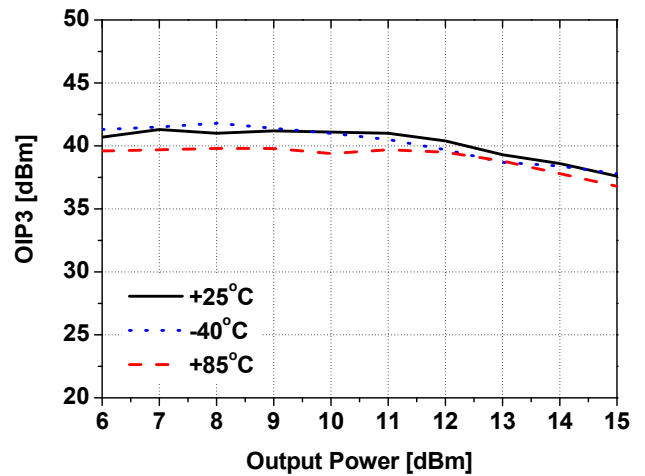
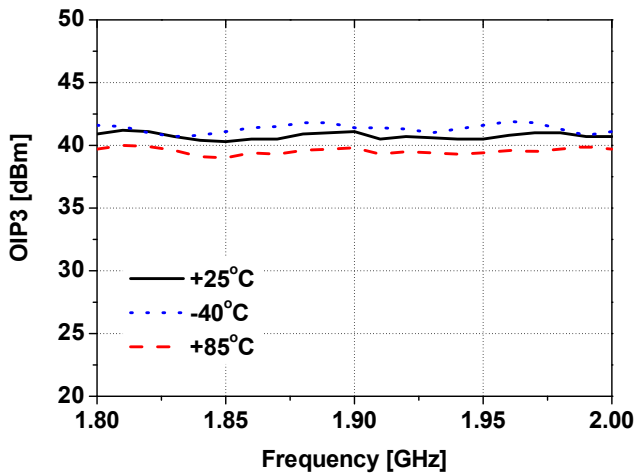


Frequency	1900 MHz
S21	15.6 dB
S11	-15 dB
S22	-12 dB
P1dB	+23.6 dBm
Output IP3 @9dBm	+40.9 dBm
NF	3.6 dB
Vcc	5 V
Icc	78 mA



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High Linearity InGaP HBT Amplifier

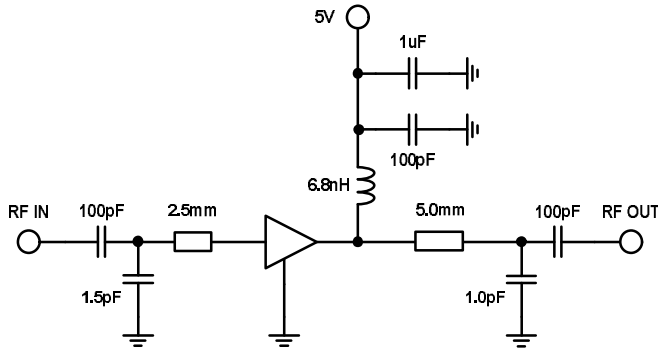


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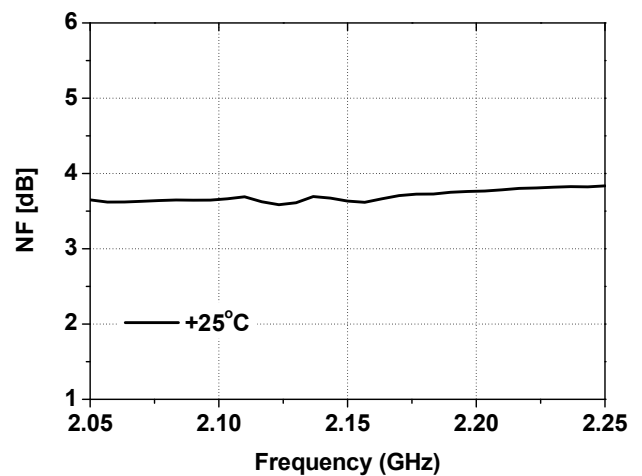
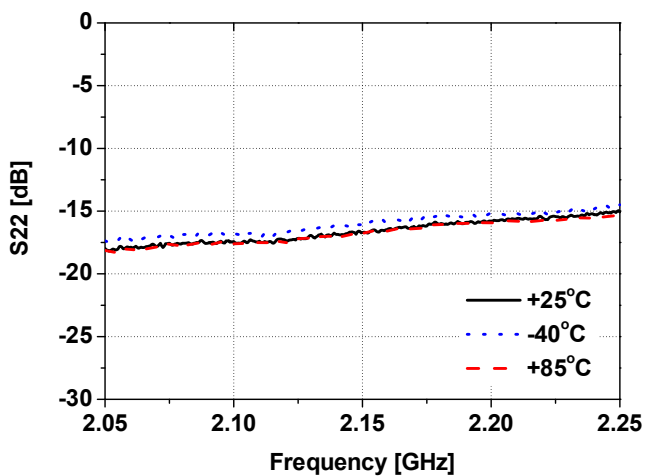
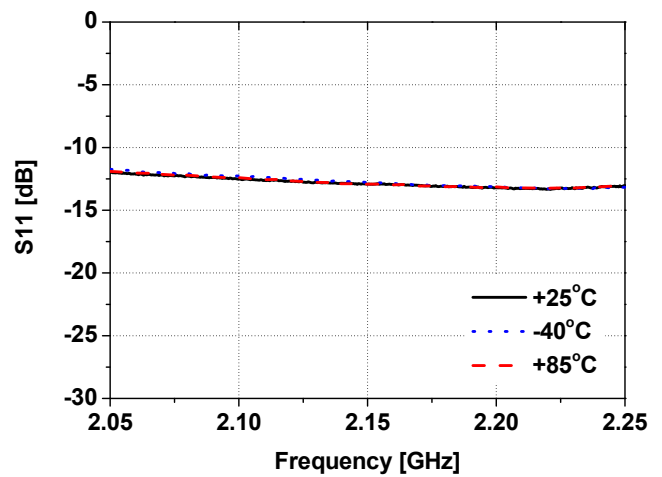
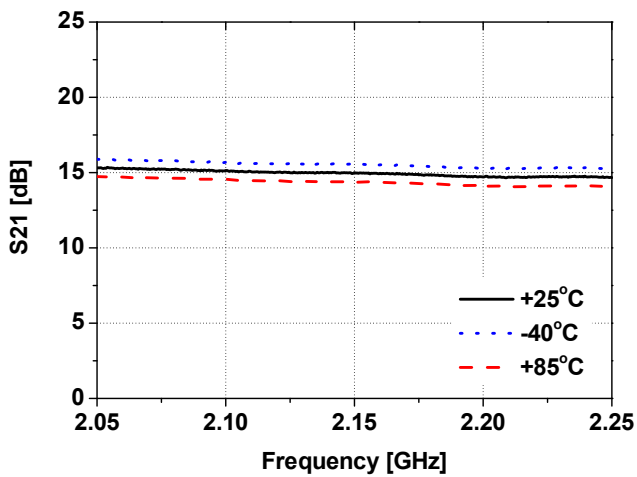
High Linearity InGaP HBT Amplifier



Typical RF Performance for 2140MHz Tuned Application Circuit

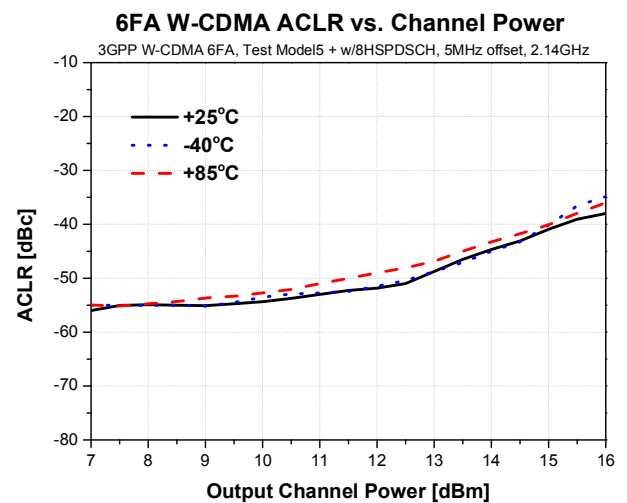
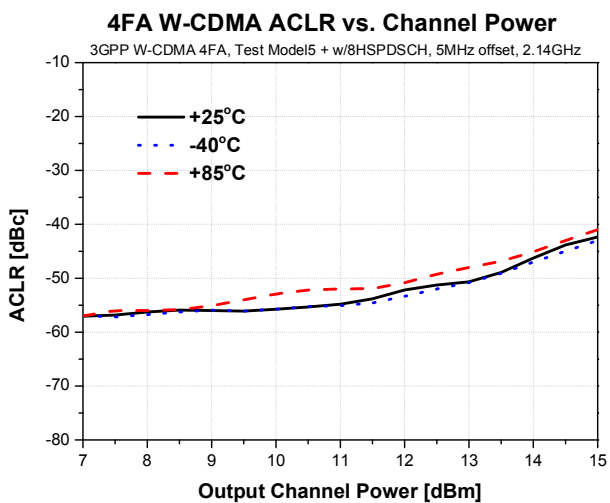
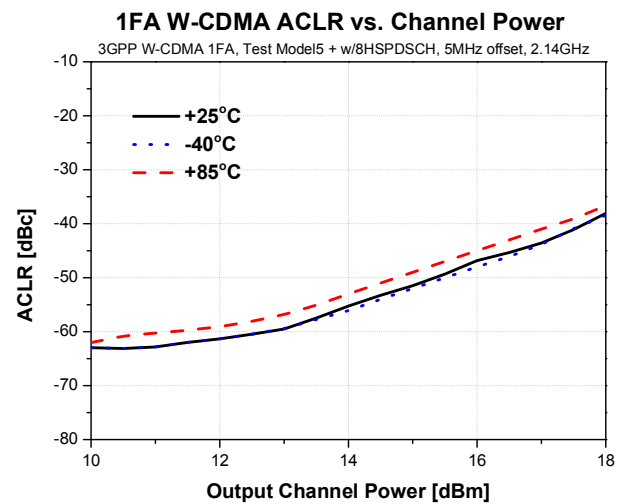
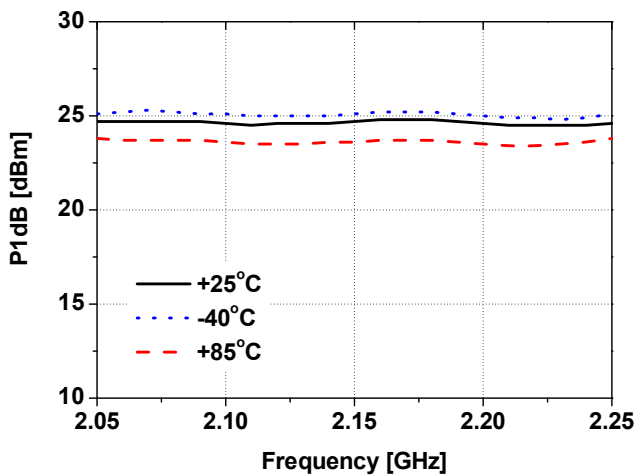
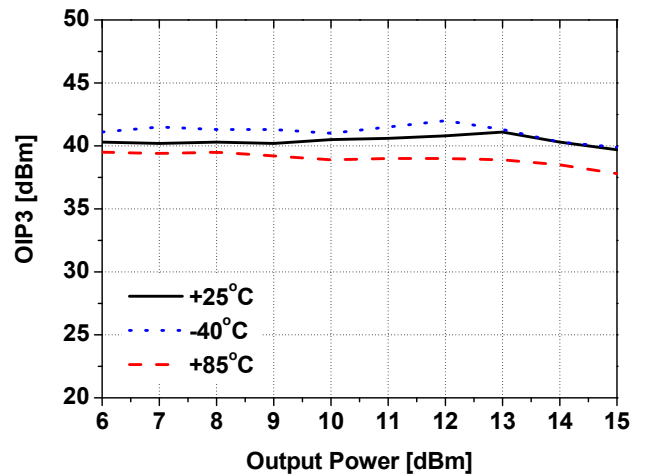
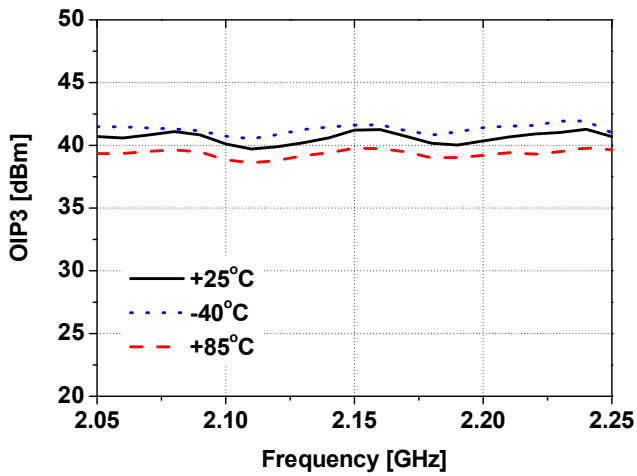


Frequency	2140 MHz
S21	14.7 dB
S11	-11.5 dB
S22	-15.5 dB
P1dB	+24.4 dBm
Output IP3 @9dBm	+40.3 dBm
NF	3.6 dB
Vcc	5 V
Icc	78 mA



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High Linearity InGaP HBT Amplifier

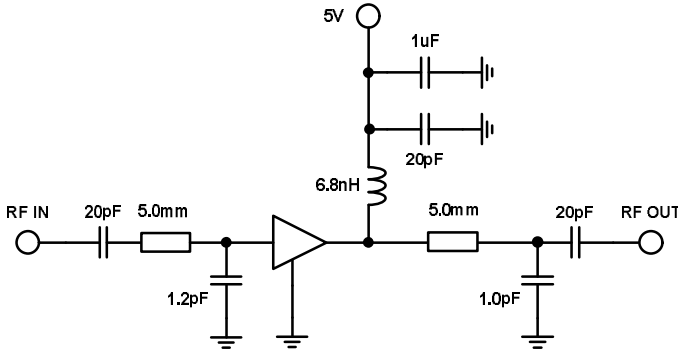


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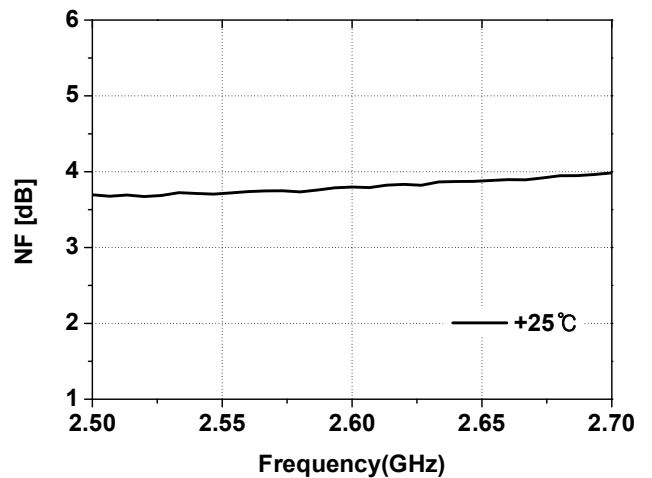
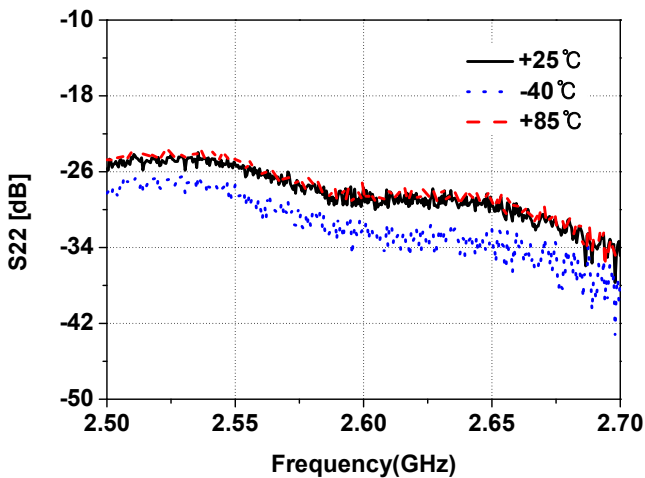
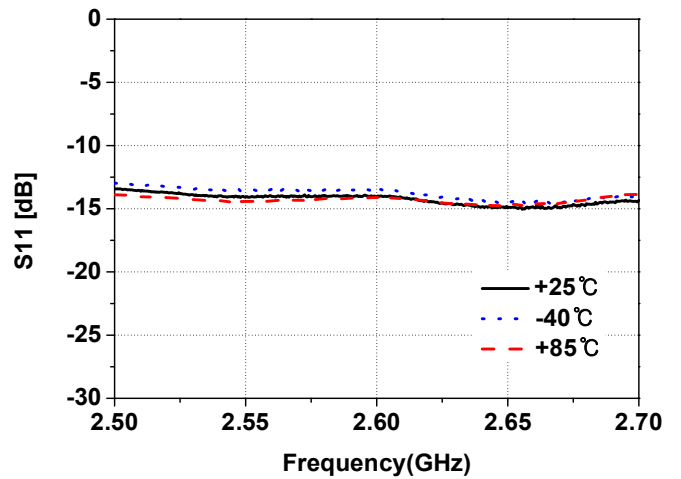
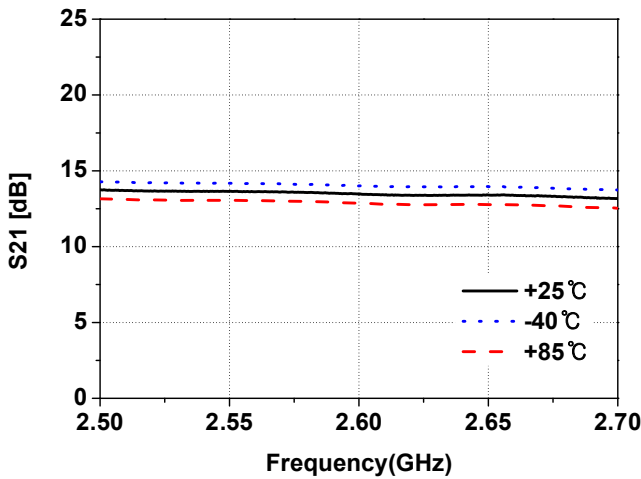
High Linearity InGaP HBT Amplifier



Typical RF Performance for 2600MHz Tuned Application Circuit

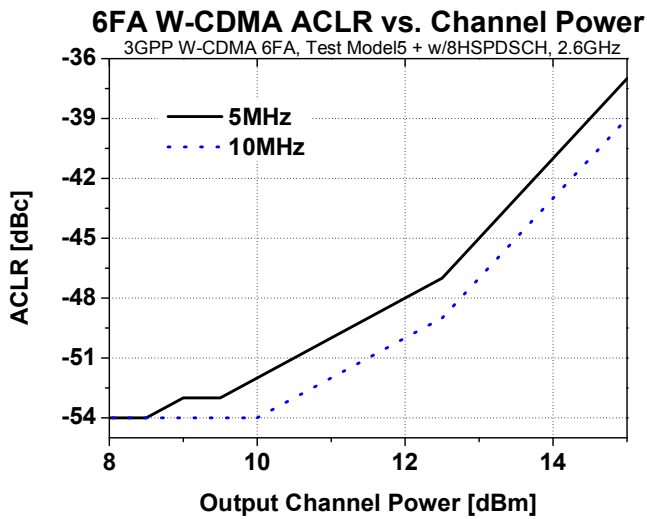
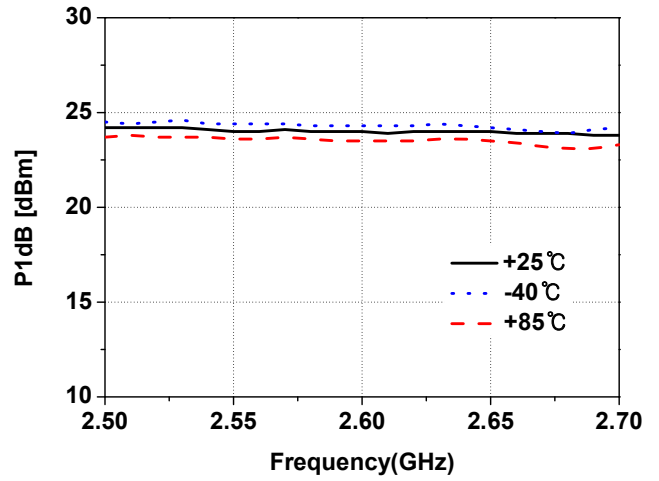
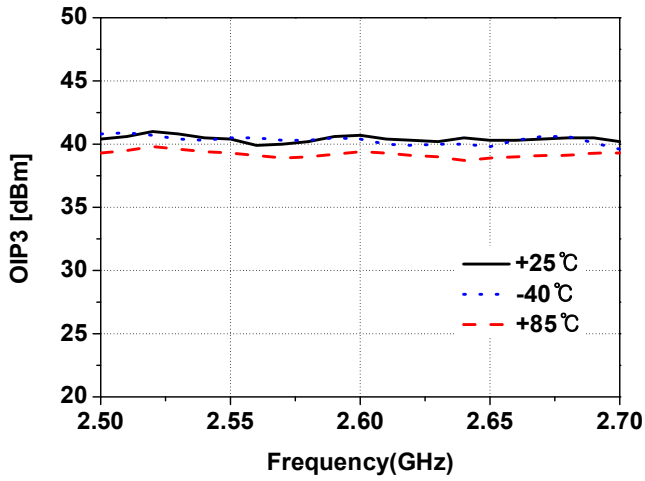


Frequency	2600 MHz
S21	13.0 dB
S11	-13.0 dB
S22	-25.0 dB
P1dB	+23.8 dBm
Output IP3 @9dBm	+40.5 dBm
NF	4.0 dB
Vcc	5 V
Icc	78 mA



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High Linearity InGaP HBT Amplifier



Absolute Maximum Ratings

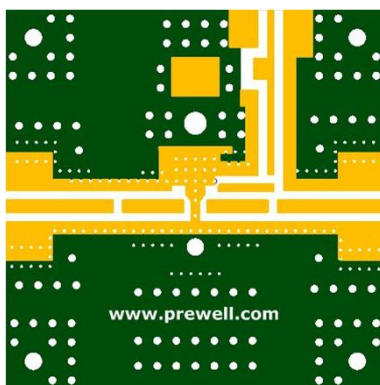
Parameter	Rating	Unit
Device Voltage	+6	V
Device Current	120	mA
RF Power Input	23	dBm
Storage Temperature	-55 to +150	°C
Ambient Operating Temperature	-40 to +85	°C
Junction Temperature for >10 ⁶ hours MTF	187	°C

Operation of this device above any of these parameters may cause permanent damage.

ESD / MSL Ratings

1. ESD sensitive device. Observe Handling Precautions.
2. ESD Rating : Class 2(Passes at 2000V min.) Human Body Model (HBM), JESD22-A114
3. ESD Rating : Class IV (Passes at 1000V min.) Charged Device Model (CDM), JESD22-C101
4. MSL (Moisture Sensitive Level) Rating : Level 1 at +260°C Convection reflow, J-STD-020

Evaluation Board Layout (4x4)



Mounting Instructions

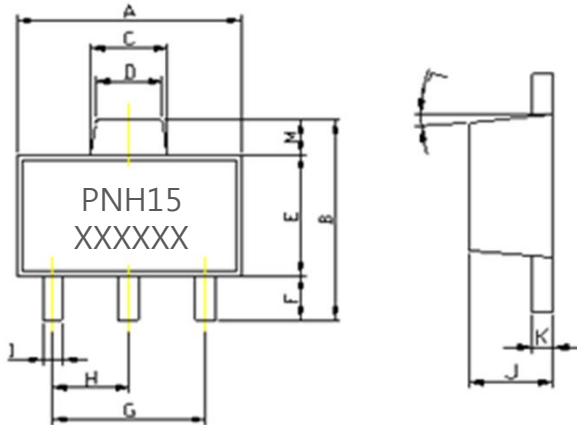
1. Use a large ground pad area with many plated through-holes as shown.
2. We recommend 1 oz copper minimum.
3. Measurement for our data sheet was made on 0.8mm thick FR-4 Board.
4. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
5. RF trace width depends on the board material and construction.
6. Add mounting screws near the part to fasten the board to a heatsink.

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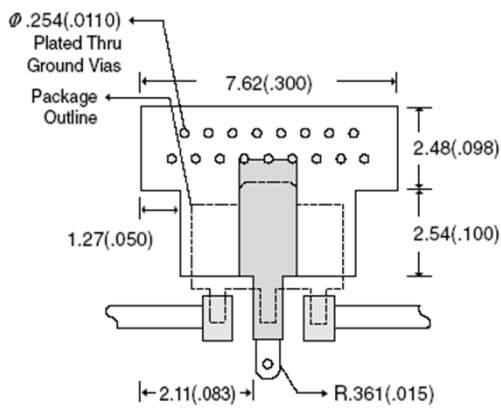
High Linearity InGaP HBT Amplifier



Lead-free / RoHS Compliant / Green SOT-89 Package Outline



REF	DIMENSIONS	
	Millimeters	
	Min.	Max.
A	4.40	4.60
B	4.05	4.25
C	1.50	1.70
D	1.30	1.50
E	2.40	2.60
F	0.89	1.20
G	3.00 REF.	
H	1.50 REF.	
J	0.40	0.52
K	1.40	1.60
L	0.35	0.41
M	5° TYP.	
	0.70 REF.	

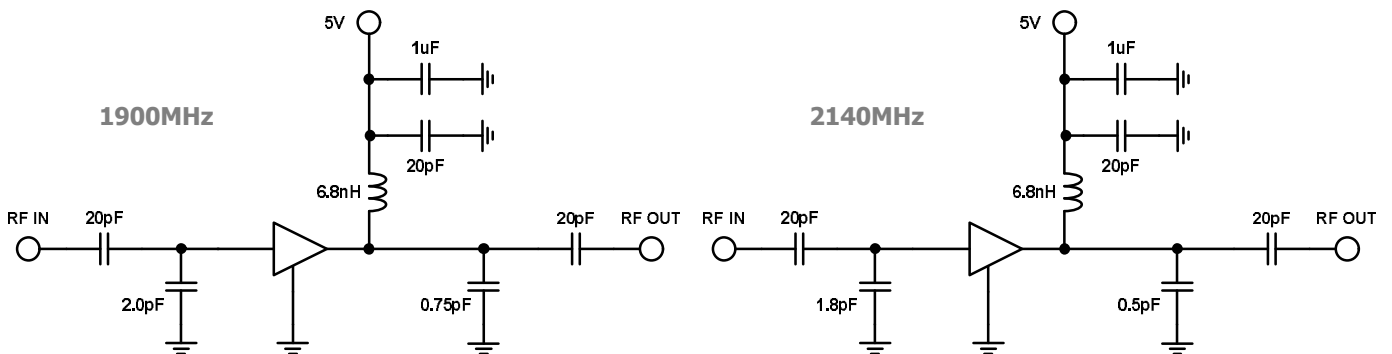
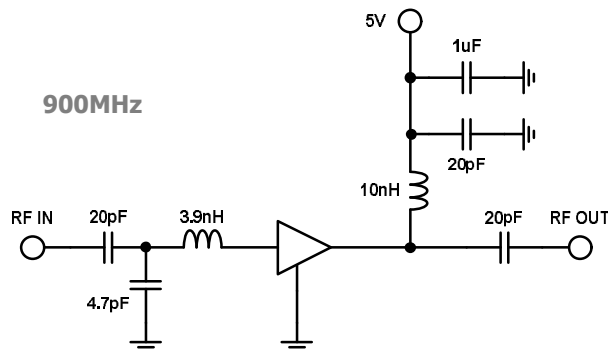


Application Note :

When used without a Transmission Line.

CAUTION:

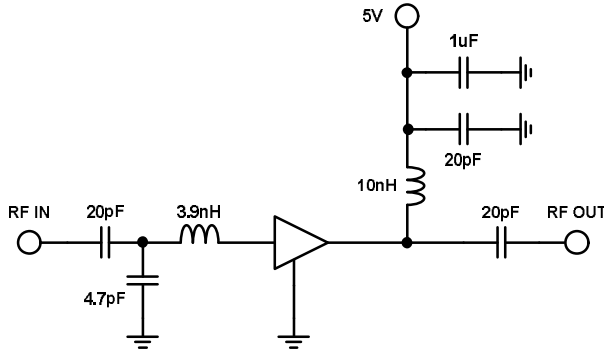
- You can use ONLY RF choke to the output circuit.
- You must apply the value of RF choke which is indicated on the application circuit.



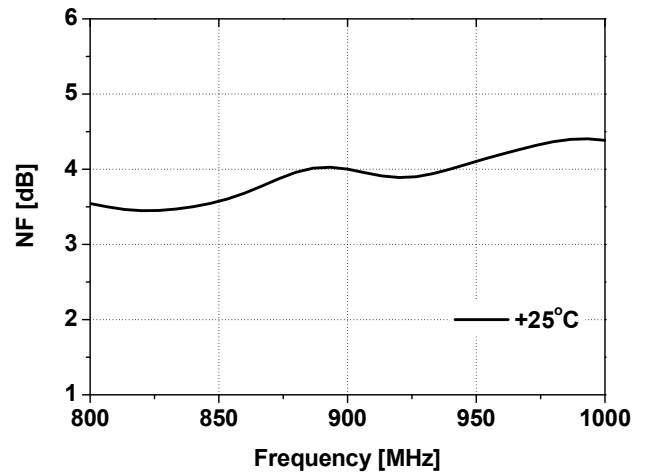
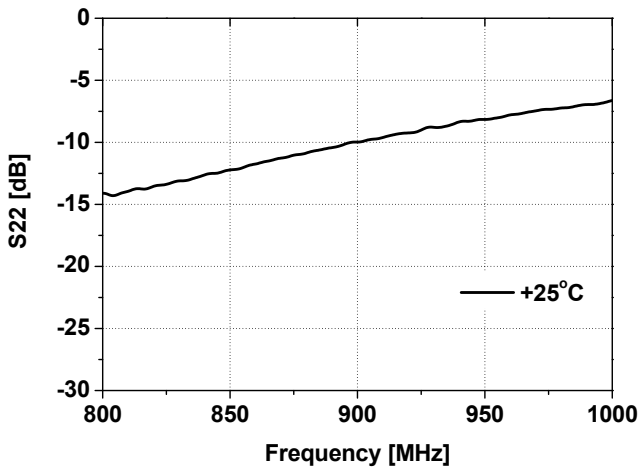
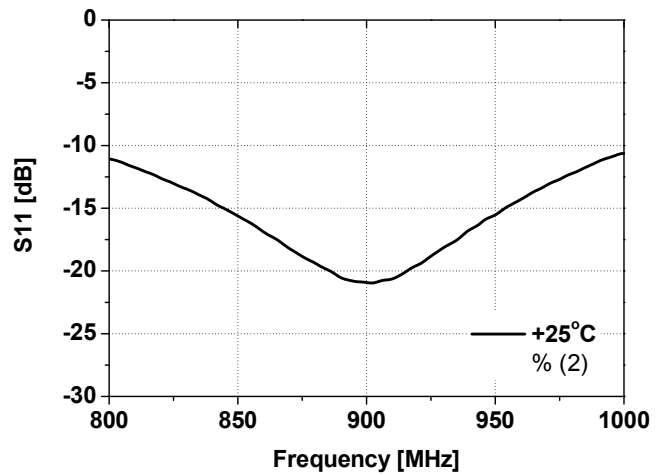
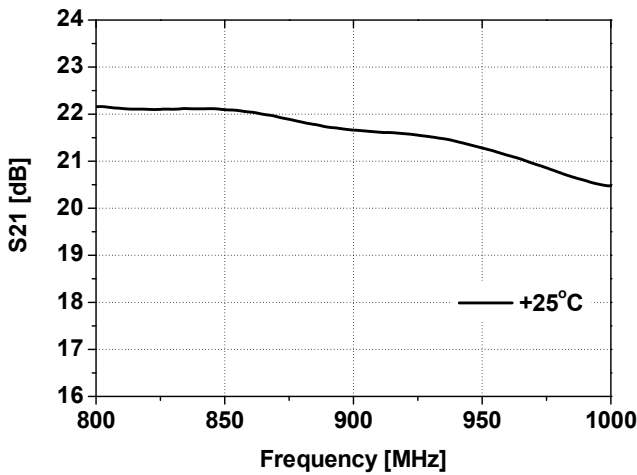
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Typical RF Performance for 900MHz Tuned Application Circuit

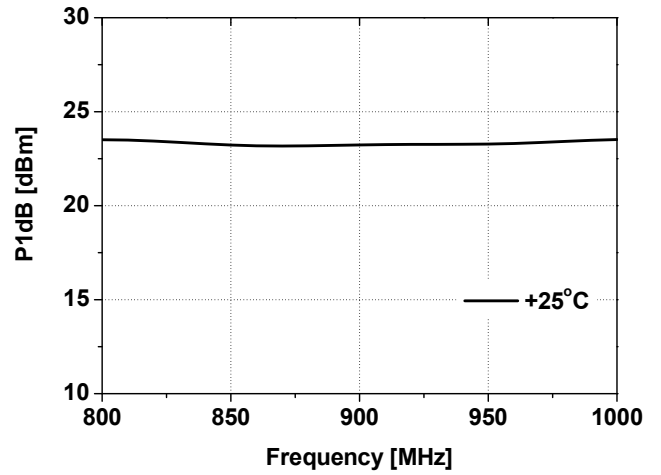
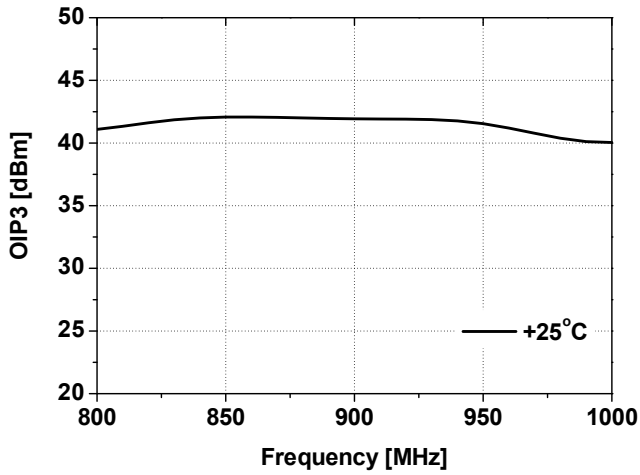


Frequency	900 MHz
S21	21.5 dB
S11	-18.0 dB
S22	-10.0 dB
P1dB	+23.3 dBm
Output IP3 @7dBm	+41.3 dBm
NF	3.3 dB
Vcc	5 V
Icc	78 mA



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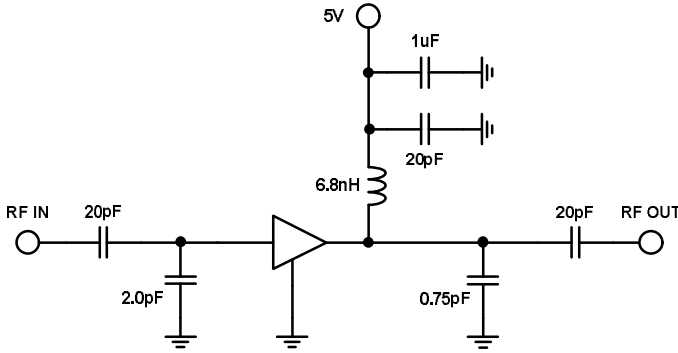
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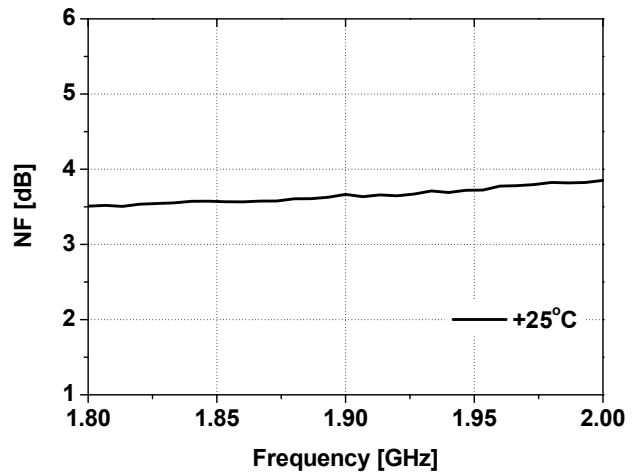
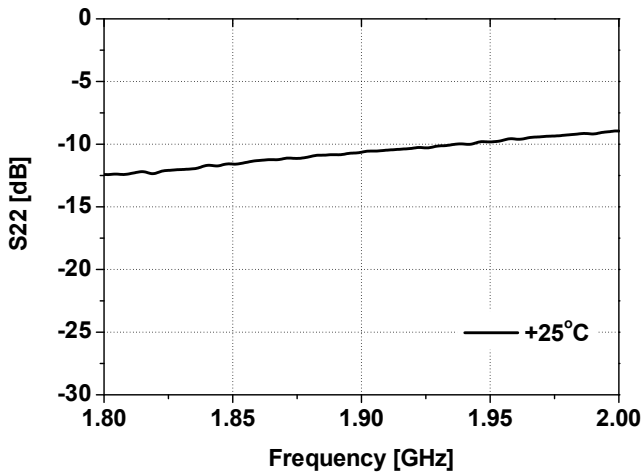
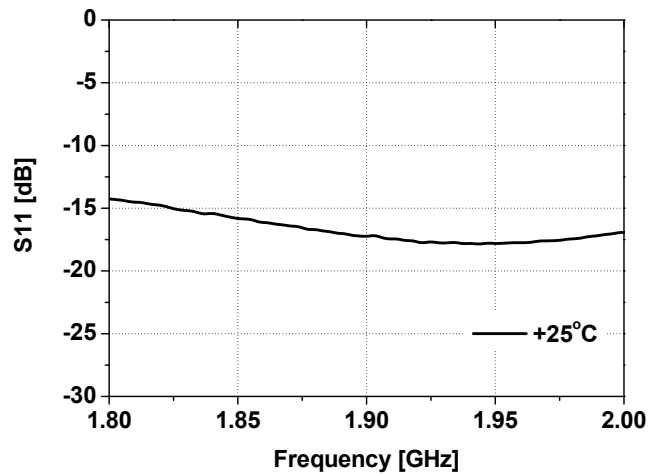
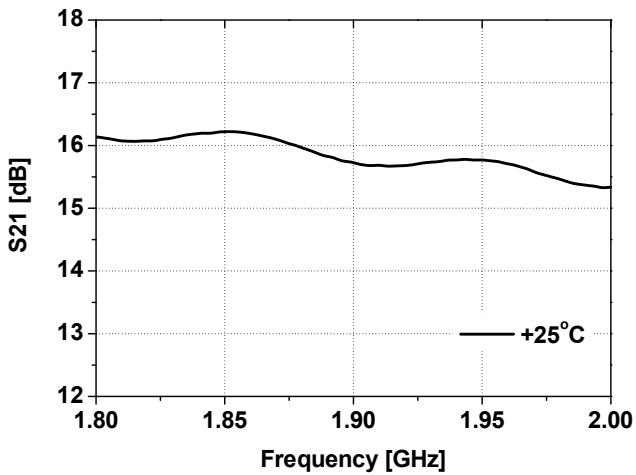
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High Linearity InGaP HBT Amplifier

Typical RF Performance for 1900MHz Tuned Application Circuit

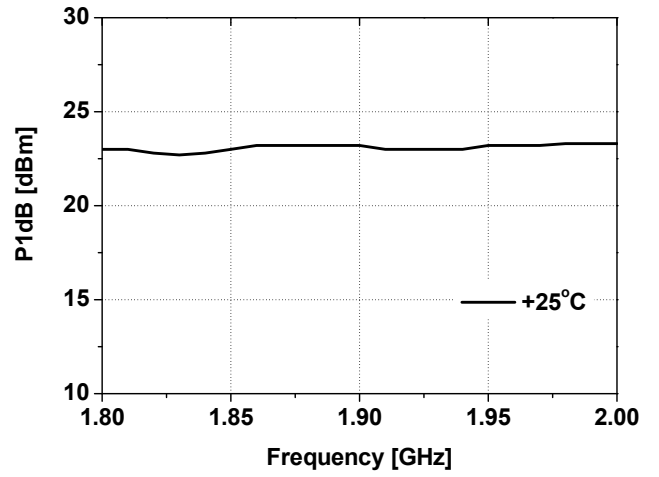
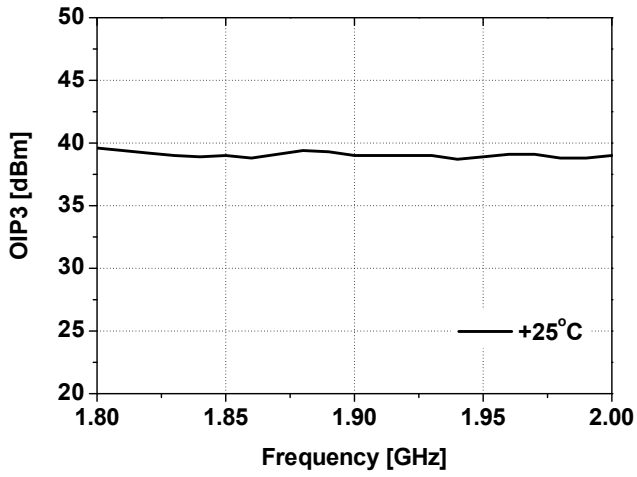


Frequency	1900 MHz
S21	15.4 dB
S11	-15.0 dB
S22	-10.0 dB
P1dB	+23.3 dBm
Output IP3 @8dBm	+38.5 dBm
NF	3.5 dB
Vcc	5 V
Icc	78 mA



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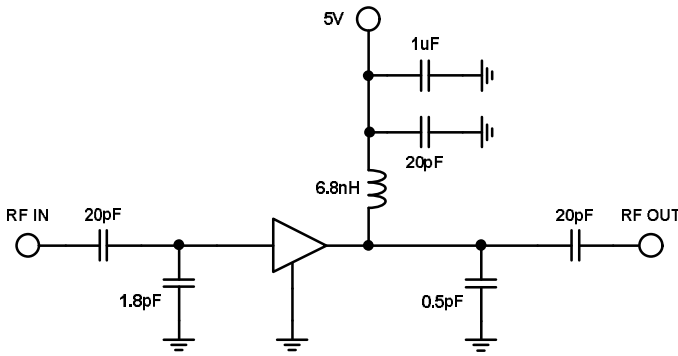
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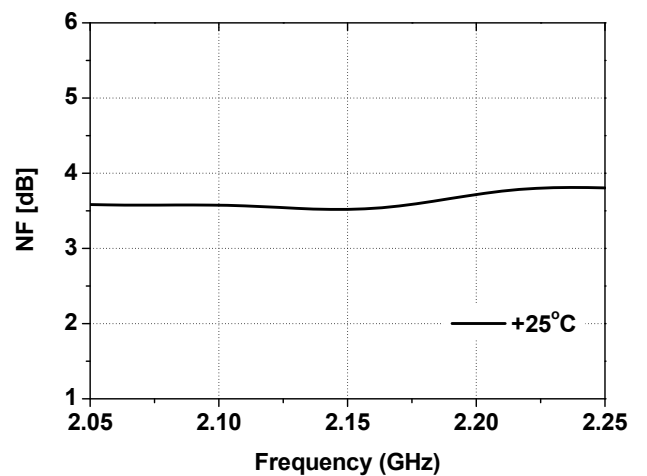
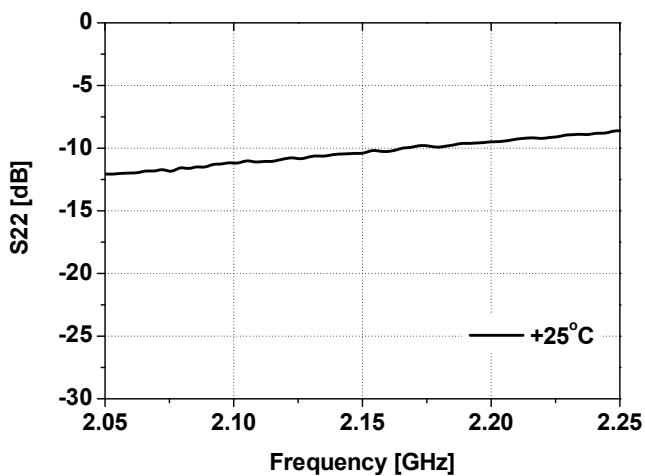
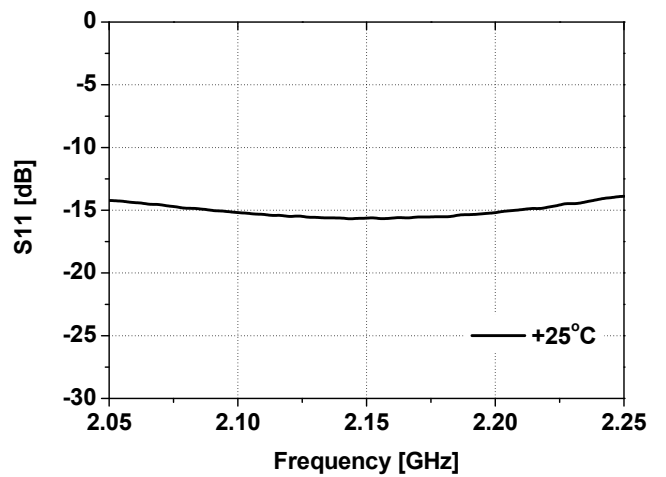
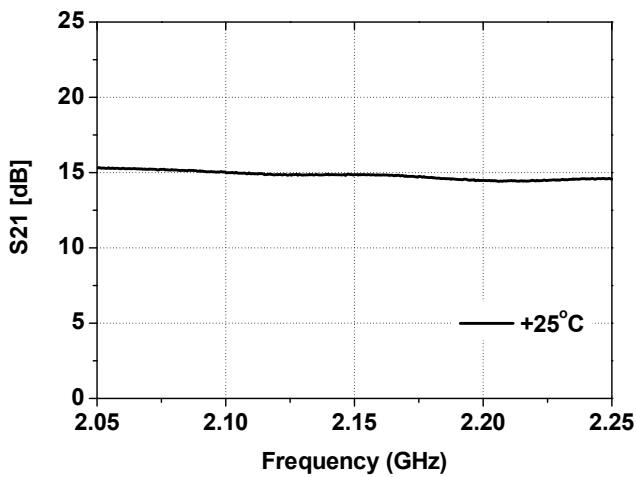
PNH15

High Linearity InGaP HBT Amplifier

Typical RF Performance for 2140MHz Tuned Application Circuit



Frequency	2140 MHz
S21	14.6 dB
S11	-13.0 dB
S22	-10.0 dB
P1dB	+22.3 dBm
Output IP3 @8dBm	+37.3 dBm
NF	3.5 dB
Vcc	5 V
Icc	78 mA



PNH15

High Linearity InGaP HBT Amplifier

