YC204

20-4000MHz Gain Block Amplifier

Description

The YC204 is a high performance GaAs HBT MMIC amplifier with an active bias network. The active bias network provides stable current over temperature and process Beta variations.

Designed to run directly from a 5V supply, the YC204 does not require a dropping resistor as compared to typical Darlington amplifiers.

The YC204 product is designed for high linearity 5V Gain block applications that require small size and minimal external components. It is internally matched to 50 Ω.

Applications

- PA Driver Amplifier
- Cellular, PCS, GSM, UMTS, LTE, 5G
- Wideband Instrumentation
- Wireless Data, Satellite Terminals

Features

- 20-4000MHz
- OIP3=35.6dBm @900MHz
- P1dB=19.7dBm @900MHz
- Gain=15.6dB @900MHz
- Current Variation/temp=0.04mA/℃
- Internally matched to 50Ω
- SOT-89 Package
- RoHS Compliant/Lead-free

Electrical Specification[1)]

Parameter	Specification			Condition	Units
	Min.	Typ.	Max.		
Gain	14.6	15.6	16.6	900MHz	dB
	14.8	15.8	16.8	1900MHz	dB
	15.2	16.2	17.2	2600MHz	dB
Output P1dB	18.7	19.7		900MHz	dBm
	17.5	18.5		1900MHz	dBm
	16.2	17.2		2600MHz	dBm
Output IP3	33.6	35.6		900MHz	dBm
	30.3	32.3		1900MHz	dBm
	27.2	29.4		2600MHz	dBm
Input Return Loss		-29.4		1900MHz	dB
Output Return Loss		-25.6		1900MHz	dB
Reverse Isolation		-19.0		1900MHz	dB
Noise Figure		4.5		1900MHz	dB
Device Voltage		5.0			V
Device Current	70	77	80		mA
Thermal Resistance		53.3			°C/W

Notes:
1) 500MHz ~ 2700MHz Application Circuit, VCC = +5 V, Temp. = +25 °C, Zo=50Ω, OIP3:Pout = +7 dBm/tone, Δf = 1 MHz

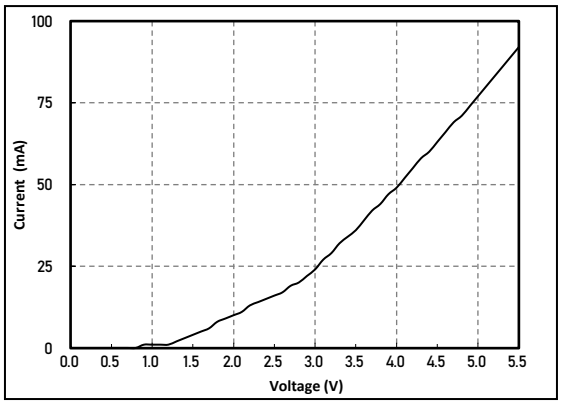
Recommended Operating Condition

Parameter	Min	Typ	Max	Units
Device Voltage		5		V
Operating Temperature	-40	25	85	°C
Junction Temperature	-		162	°C

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage	6	V
Supply Current	106	mA
Storage Temperature	-55~+150	°C
RF Input Power	23	dBm

I-V Curve



MSL Rating

MSL Rating : Level 3
Test : 260℃ Convection Reflow
Standard : JEDEC Standard IPC/JEDEC J-STD-020

ESD Sensitivity Ratings

ESD Rating : Class 1C
Test : Human Body Model (HBM)
Standard : JEDEC Standard JS-001-2012

Typical RF Performance

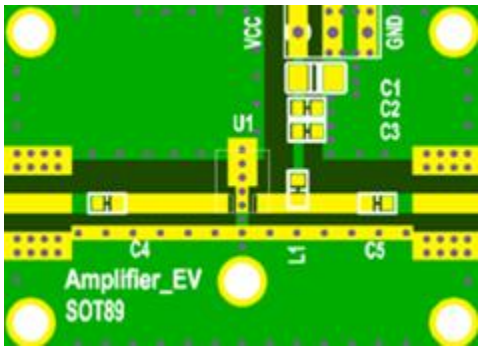
20MHz ~ 2400MHz Application Circuit , VCC = +5 V, Temp. = +25 °C, Zo=50Ω

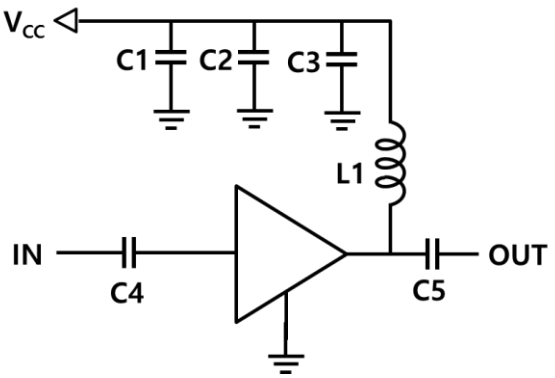
Frequency(MHz)	20	50	150	450	700	Units
S21	17.5	17.1	16.2	15.5	15.4	dB
S11	-10.9	-11.6	-17.9	-20.1	-21.7	dB
S22	-5.9	-6.9	-10.9	-16.1	-15.0	dB
Output P1dB	18.7	18.7	18.6	19.0	19.3	dBm
Output IP3[1)]	34.0	35.9	35.6	35.0	34.5	dBm
Noise Figure	4.3	4.3	4.4	4.7	4.6	dB

Frequency(MHz)	900	1900	2100	2400	2600	Units
S21	15.3	15.2	14.9	14.1	14.8	dB
S11	-21.3	-14.3	-13.4	-12.1	-10.7	dB
S22	-14.2	-10.4	-9.7	-8.8	-8.1	dB
Output P1dB	19.3	17.2	18.0	16.4	14.6	dBm
Output IP3[1)]	34.6	31.1	30.2	29.2	25.7	dBm
Noise Figure	4.7	4.9	5.4	5.0	4.9	dB

Notes:
1) OIP3:Pout = +7 dBm/tone, Δf = 1 MHz

Evaluation Board Information





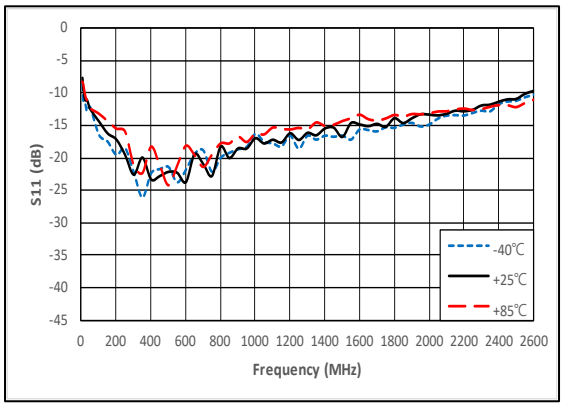
① PCB: FR4 ② RF width: 1.34 mm
③ PCB thick: 0.8 mm

Component	Frequency
	20MHz ~ 2400MHz
L1	22uH
C4,C5	2.2uF
C1 / C2 / C3	10uF / 1000pF / 100pF

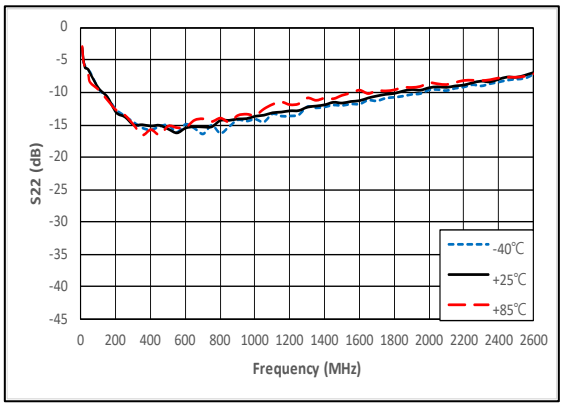
Performance Plots

20MHz ~ 2400MHz Application Circuit , VCC = +5 V, Zo=50Ω

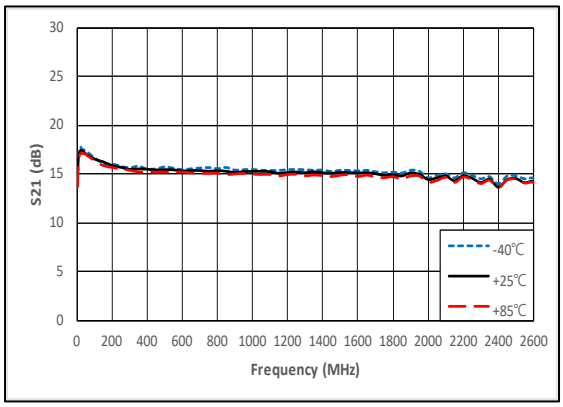
Input Return



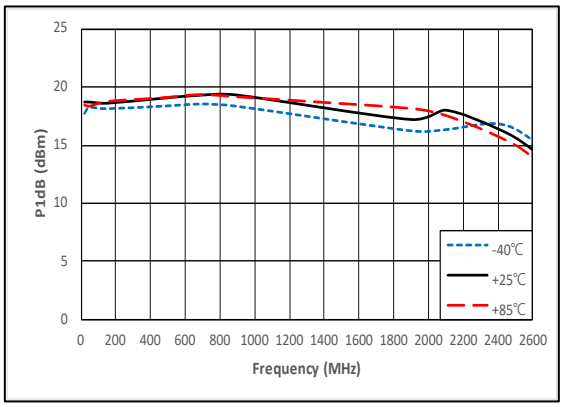
Output Return



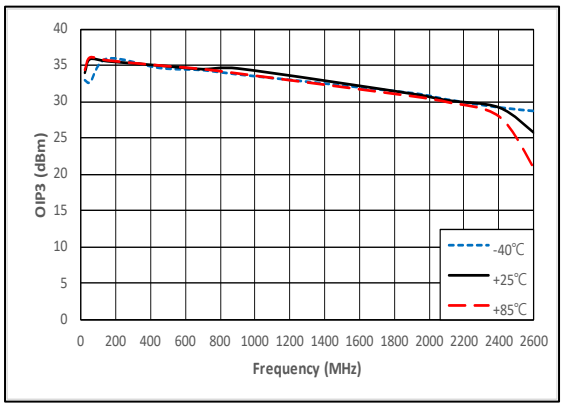
Gain



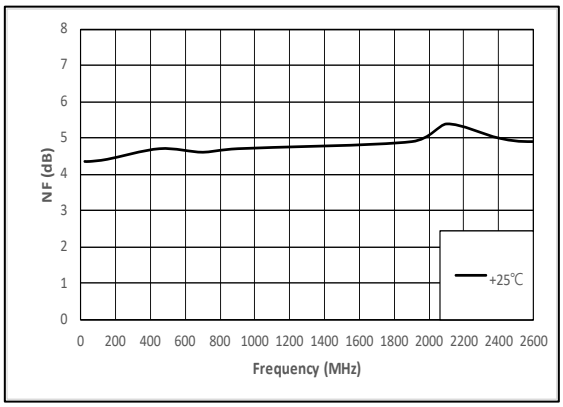
P1dB



OIP3 (@ 7dBm/Tone)



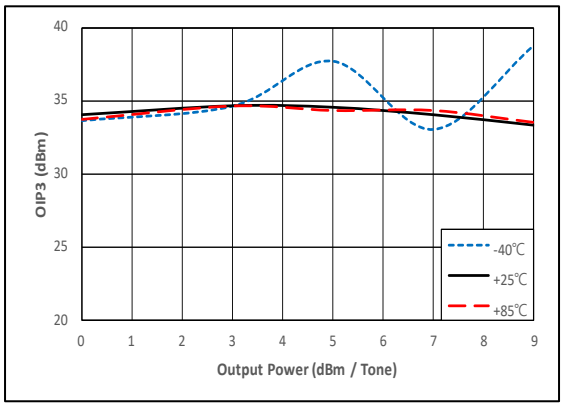
NF



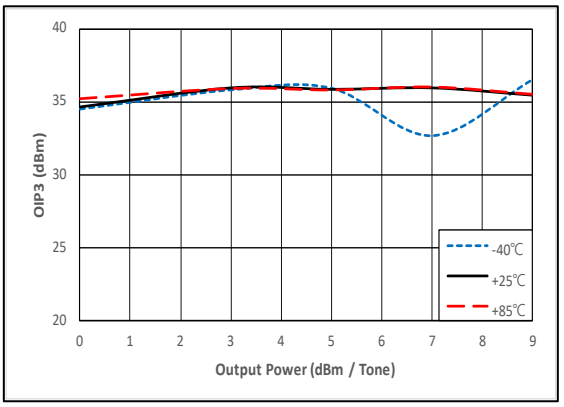
Performance Plots

20MHz ~ 2400MHz Application Circuit , VCC = +5 V, Zo=50Ω

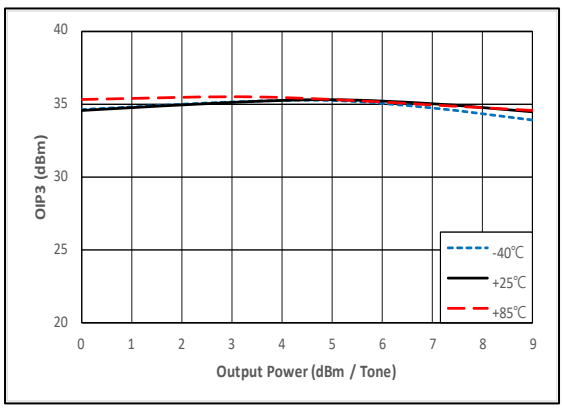
OIP3 (20MHz)



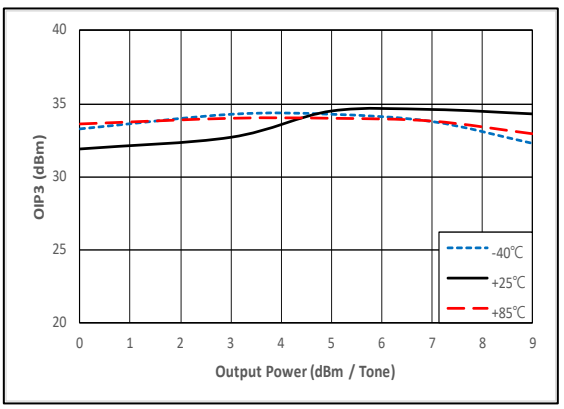
OIP3 (50MHz)



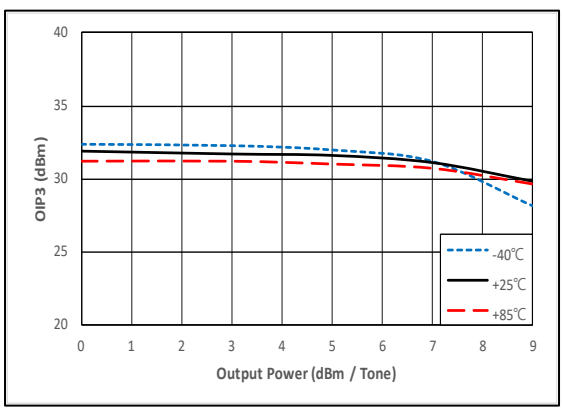
OIP3 (450MHz)



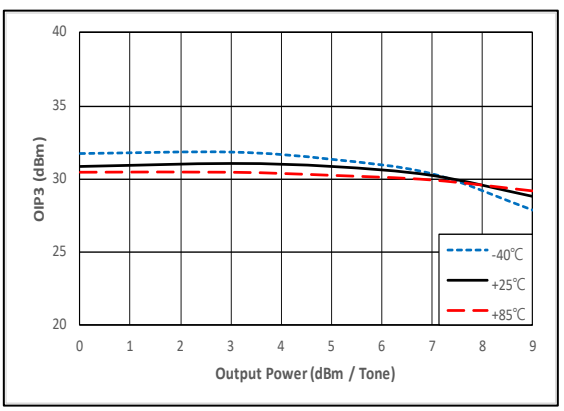
OIP3 (900MHz)



OIP3 (1900MHz)



OIP3 (2100MHz)



Typical RF Performance

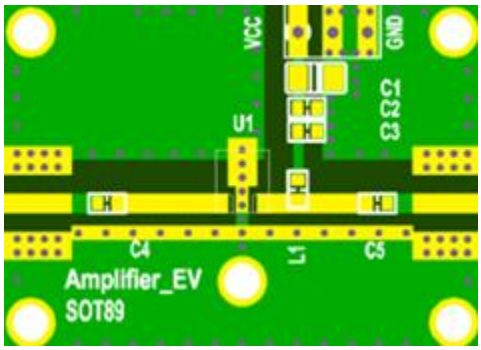
500MHz ~ 2700MHz Application Circuit , VCC = +5 V, Temp. = +25 °C, Zo=50Ω

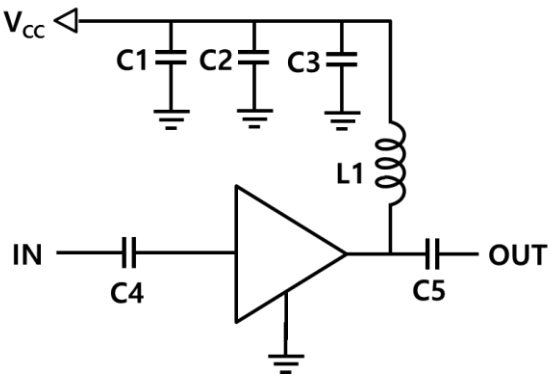
Frequency(MHz)	150	450	700	900	1900	2100	Units
S21	14.2	15.5	15.6	15.6	15.8	15.8	dB
S11	-4.3	-12.6	-17.7	-20.3	-29.4	-26.3	dB
S22	-5.1	-16.1	-23.4	-32.5	-25.6	-25.3	dB
Output P1dB	14.4	19.0	19.4	19.7	18.5	18.2	dBm
Output IP3[1)]	28.4	35.8	36.4	35.6	32.3	31.1	dBm
Noise Figure	4.3	4.5	4.4	4.5	4.5	4.6	dB

Frequency(MHz)	2400	2600	3000	3300	3600	4000	Units
S21	15.9	16.2	16.6	16.9	17.2	17.7	dB
S11	-26.3	-25.3	-23.1	-20.3	-17.3	-12.9	dB
S22	-23.9	-22.3	-22.9	-25.0	-25.9	-20.9	dB
Output P1dB	17.4	17.2	16.0	15.4	14.7	13.1	dBm
Output IP3[1)]	30.2	29.4	27.4	25.6	24.2	20.7	dBm
Noise Figure	4.6	4.5	5.0	5.1	5.1	5.2	dB

Notes:
1) OIP3:Pout = +7 dBm/tone, Δf = 1 MHz

Evaluation Board Information





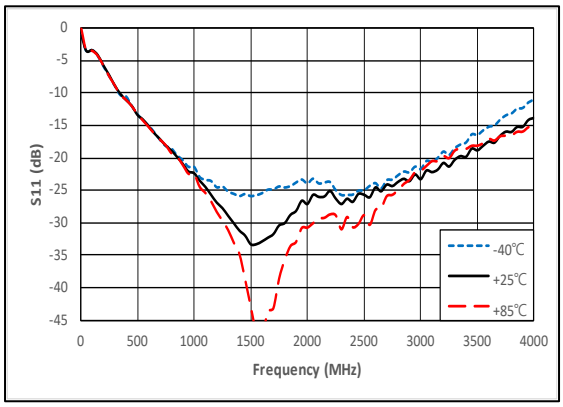
① PCB: FR4 ② RF width: 1.34 mm
③ PCB thick: 0.8 mm

Component	Frequency
	500MHz ~ 2700MHz
L1	33nH
C4,C5	100pF
C1 / C2 / C3	10uF / 1000pF / 100pF

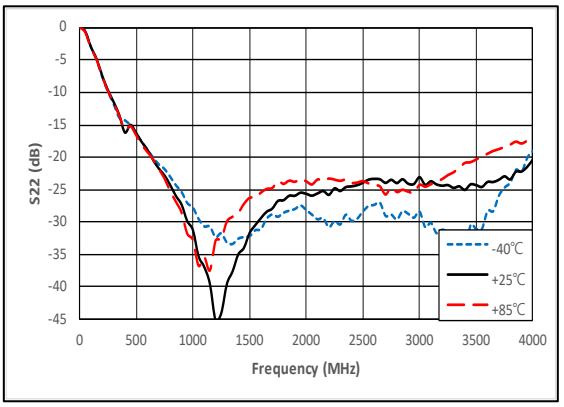
Performance Plots

500MHz ~ 2700MHz Application Circuit , VCC = +5 V, Zo=50Ω

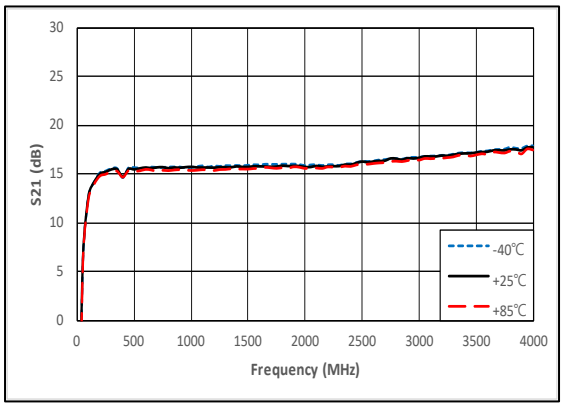
Input Return



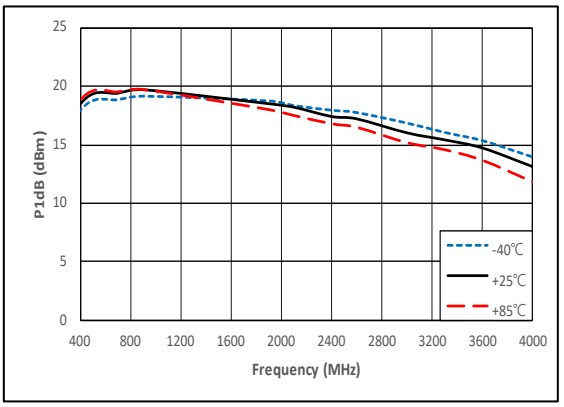
Output Return



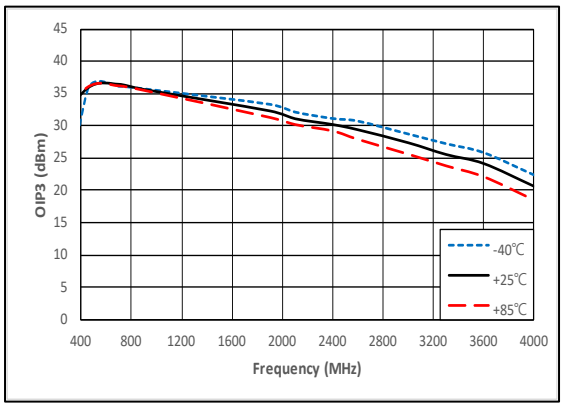
Gain



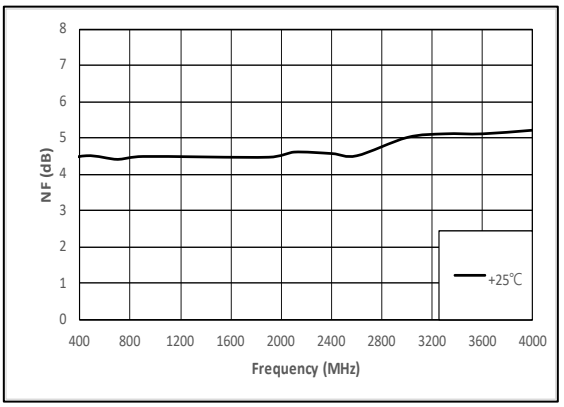
P1dB



OIP3 (@ 7dBm/Tone)



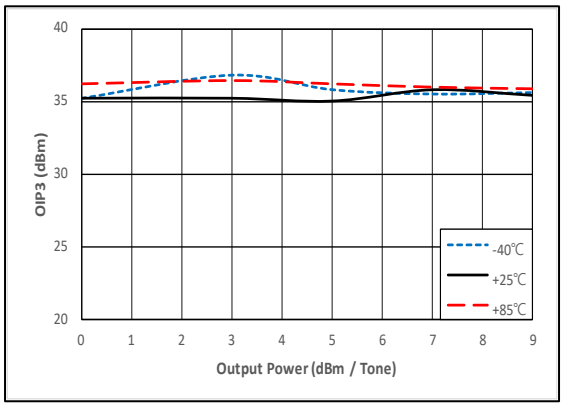
NF



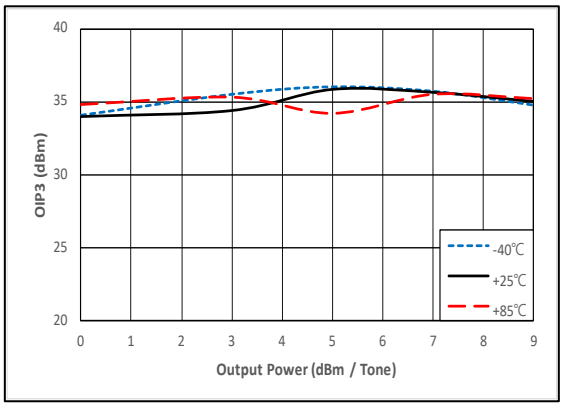
Performance Plots

500MHz ~ 2700MHz Application Circuit , VCC = +5 V, Zo=50Ω

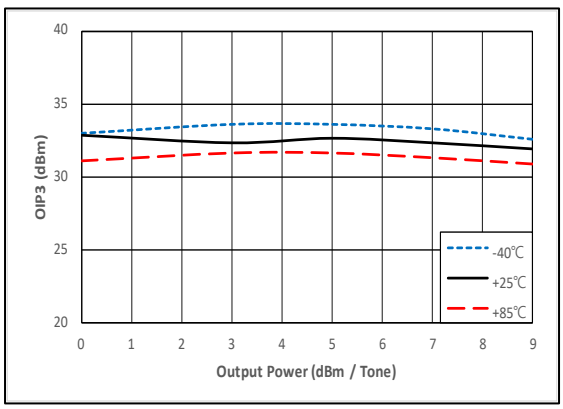
OIP3 (450MHz)



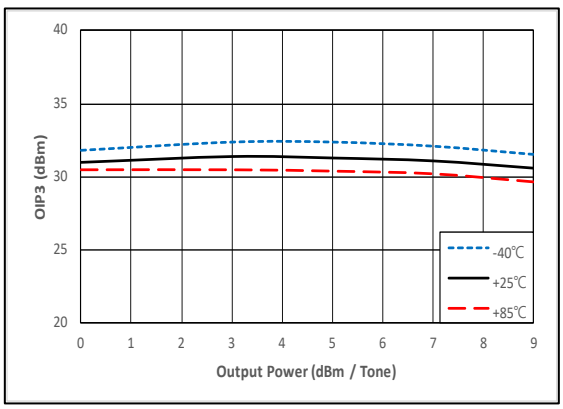
OIP3 (900MHz)



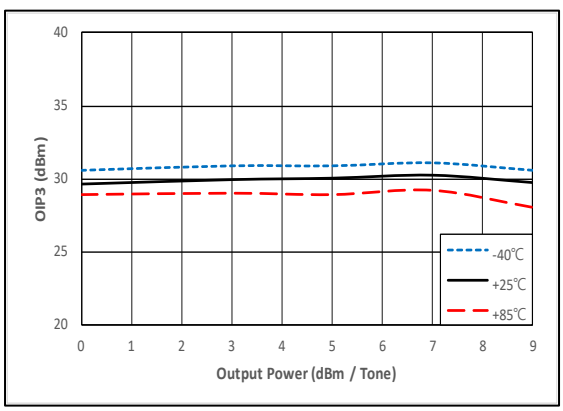
OIP3 (1900MHz)



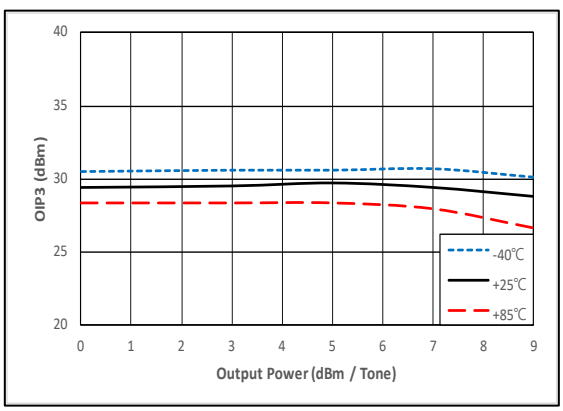
OIP3 (2100MHz)



OIP3 (2400MHz)



OIP3 (2600MHz)



Typical RF Performance

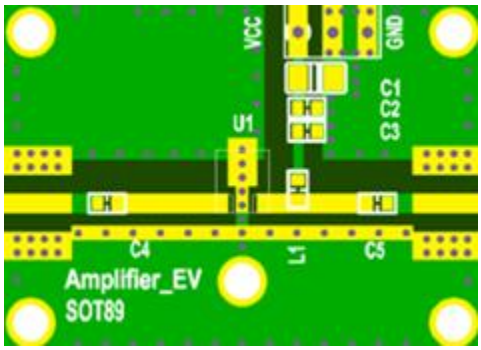
2600MHz ~ 3600MHz Application Circuit , VCC = +5 V, Temp. = +25 °C, Zo=50Ω

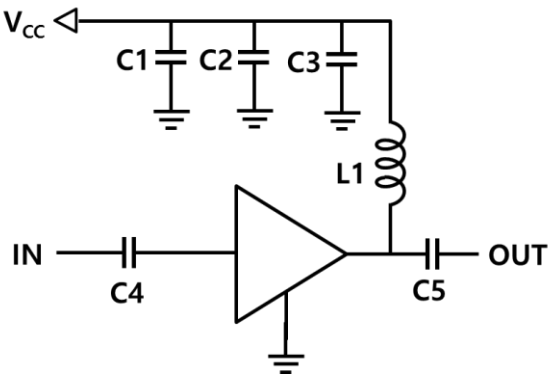
Frequency(MHz)	2400	2500	2600	2700	2800	2900	Units
S21	16.0	16.1	16.2	16.2	16.3	16.4	dB
S11	-26.4	-26.4	-26.1	-25.0	-27.8	-27.3	dB
S22	-25.3	-24.9	-25.5	-25.7	-25.7	-26.0	dB
Output P1dB	17.6	17.5	17.2	17.0	16.8	16.6	dBm
Output IP3[1)]	30.3	30.0	29.2	28.4	28.2	27.8	dBm
Noise Figure	4.6	4.7	4.7	4.6	4.6	4.6	dB

Frequency(MHz)	3000	3100	3200	3300	3400	3600	Units
S21	16.5	16.6	16.7	16.8	16.9	17.0	dB
S11	-24.4	-25.1	-23.3	-21.4	-20.8	-17.2	dB
S22	-24.3	-24.9	-28.1	-28.9	-34.2	-29.0	dB
Output P1dB	16.2	16.0	15.6	15.5	15.6	14.9	dBm
Output IP3[1)]	27.2	26.6	26.0	25.6	25.3	23.9	dBm
Noise Figure	4.6	4.7	4.7	4.7	4.7	4.6	dB

Notes:
1) OIP3:Pout = +7 dBm/tone, Δf = 1 MHz

Evaluation Board Information





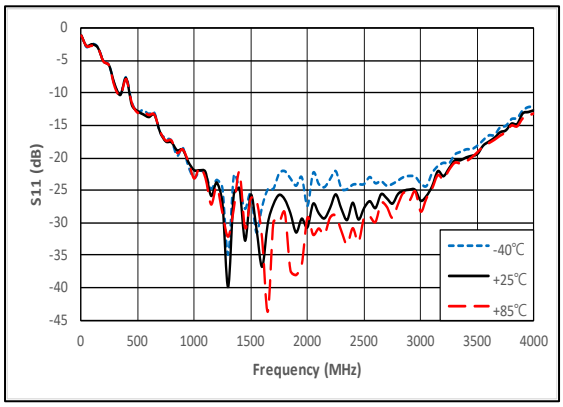
① PCB: FR4 ② RF width: 1.34 mm
③ PCB thick: 0.8 mm

Component	Frequency
	2600MHz ~ 3600MHz
L1	27nH
C4,C5	39pF
C1 / C2 / C3	10uF / 1000pF / 100pF

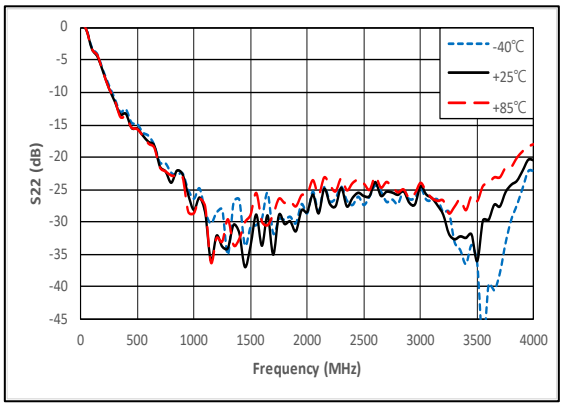
Performance Plots

2600MHz ~ 3600MHz Application Circuit , VCC = +5 V, Zo=50Ω

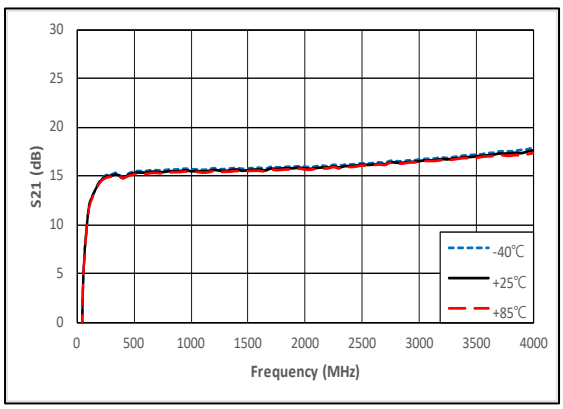
Input Return



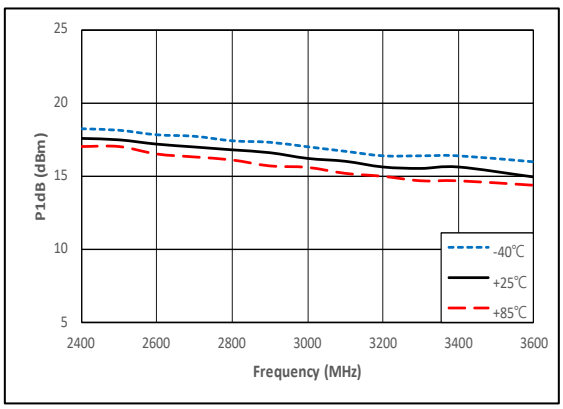
Output Return



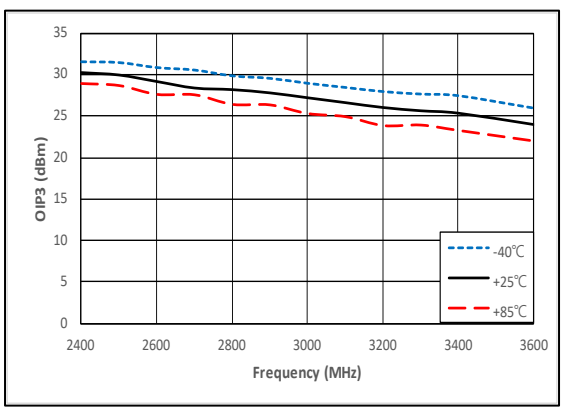
Gain



P1dB



OIP3 (@ 7dBm/Tone)



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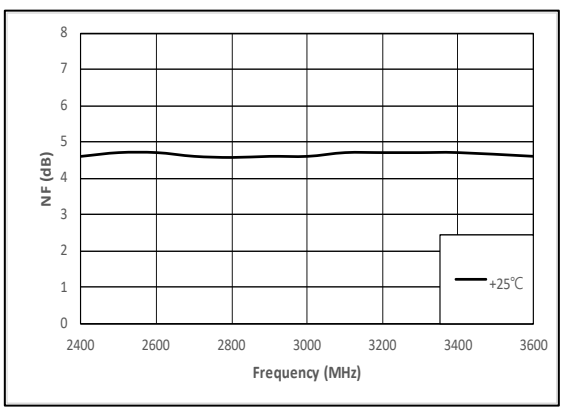
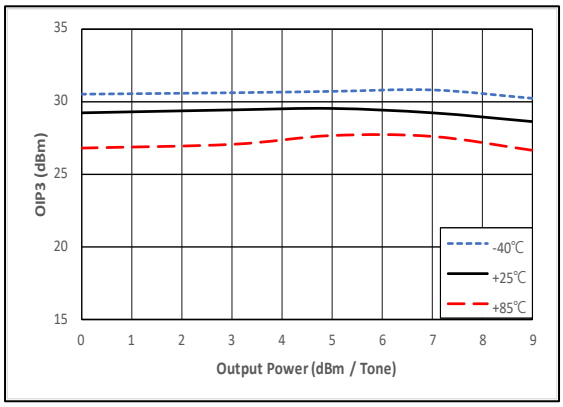


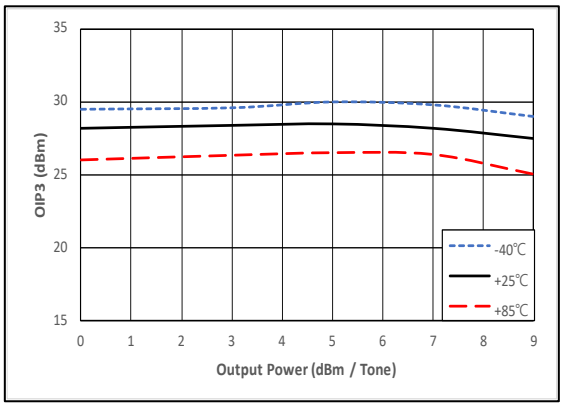
Performance Plots

2600MHz ~ 3600MHz Application Circuit , VCC = +5 V, Zo=50Ω

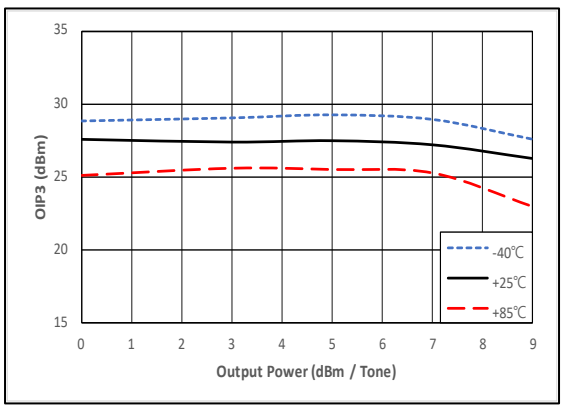
OIP3 (2600MHz)



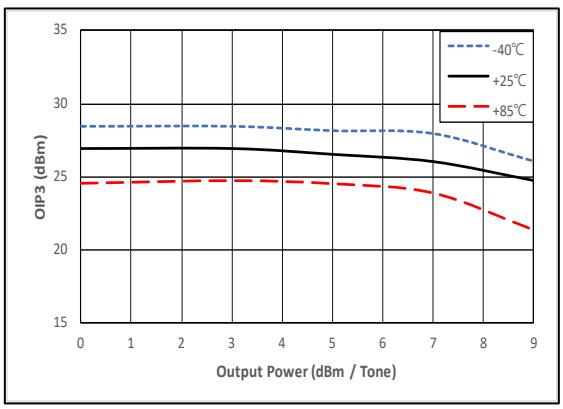
OIP3 (2800MHz)



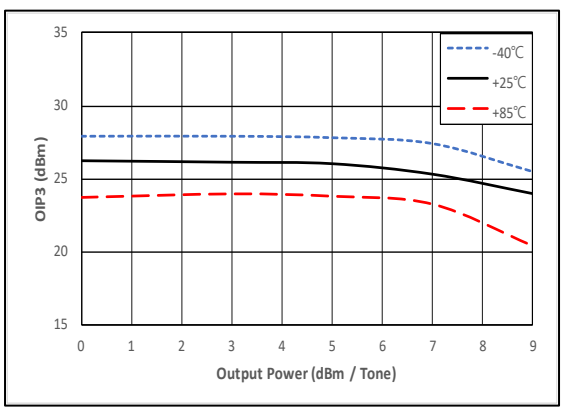
OIP3 (3000MHz)



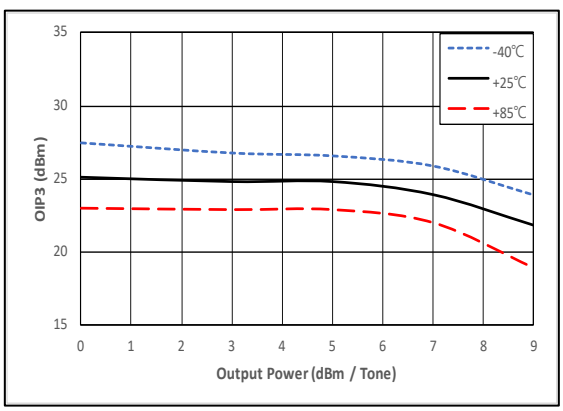
OIP3 (3200MHz)



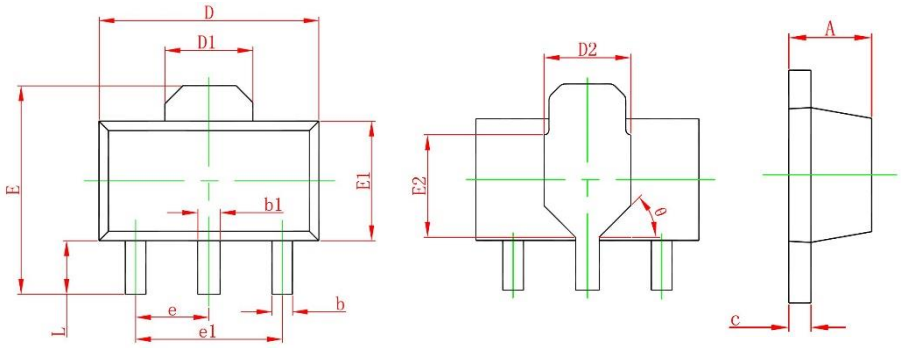
OIP3 (3400MHz)



OIP3 (3600MHz)

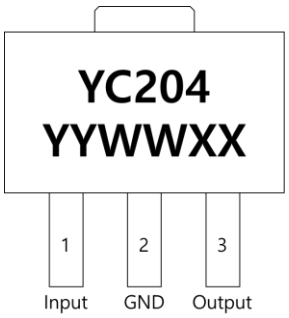


Package Outline Drawing



SOT-89		
Symbol	Min	Max
A	1.400	1.600
b	0.320	0.520
b1	0.380	0.580
c	0.350	0.440
D	4.400	4.600
D1	1.550 REF.	
D2	1.750 REF.	
E	3.940	4.250
E1	2.300	2.600
E2	1.900 REF.	
e	1.500 TYP.	
e1	3.000 TYP.	
L	0.900	1.200
θ	45º	
All Dimensions in mm		

Package Marking



P/N : YC204
YY : Year
WW : Week
XX : Wafer No.

PCB Land Pattern