



Description

The YC205 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 YC205 does not require a dropping resistor as compared to typical Darlington amplifiers.

The YC205 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=34.3dBm @900MHz
- ◆ P1dB=20.9dBm @900MHz
- ◆ Gain=21.3dB @900MHz
- ◆ Current Variation/temp=0.04mA/°C
- ◆ Internally matched to 50 Ω
- ◆ SOT-89 Package
- ◆ RoHS Compliant/Lead-free

Electrical Specification¹⁾

Parameter	Specification			Condition	Units
	Min.	Typ.	Max.		
Gain	20.3	21.3	22.3	900MHz	dB
	19.8	20.8	21.8	1900MHz	dB
	19.4	20.4	21.4	2600MHz	dB
Output P1dB	19.9	20.9		900MHz	dBm
	18.4	19.4		1900MHz	dBm
	16.5	17.5		2600MHz	dBm
Output IP3	32.3	34.3		900MHz	dBm
	29.6	31.6		1900MHz	dBm
	27.3	29.3		2600MHz	dBm
Input Return Loss		-19.15		1900MHz	dB
Output Return Loss		-19.21		1900MHz	dB
Reverse Isolation		-23.8		1900MHz	dB
Noise Figure		4.0		900MHz	dB
Device Voltage		5.0			V
Device Current	65	73	85		mA
Thermal Resistance		53.3			°C/W

Notes:

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

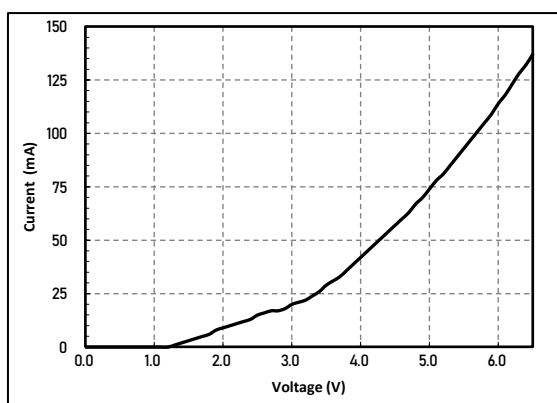
Recommended Operating Condition

Parameter	Min	Typ	Max	Units
Device Voltage		5		V
Operating Temperature	-40	25	85	°C
Junction Temperature	-		173	°C

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage	6	V
Supply Current	140	mA
Storage Temperature	-55~+150	°C
RF Input Power	23	dBm

I-V Curve



MSL Rating

MSL Rating : Level 3
 Test : 260°C 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, $V_{CC} = +5V$, Temp. = $+25^{\circ}C$, $Z_0=50\Omega$

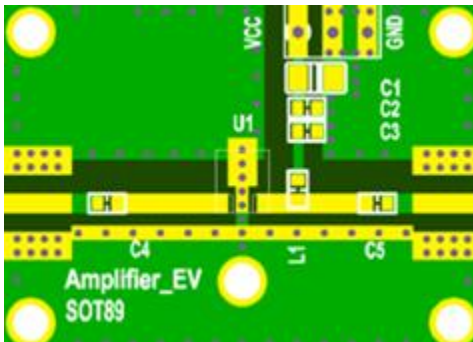
Frequency(MHz)	20	50	150	450	700	Units
S21	21.9	22.1	21.7	21.3	21.1	dB
S11	-10.0	-14.77	-19.9	-21.3	-20.3	dB
S22	-6.6	-9.7	-15.4	-17.7	-16.4	dB
Output P1dB	18.2	18.9	19.9	20.7	20.8	dBm
Output IP3 ¹⁾	32.0	34.1	34.0	33.4	33.1	dBm
Noise Figure	3.8	3.7	3.6	3.8	3.8	dB

Frequency(MHz)	900	1900	2100	2400	2600	Units
S21	21.0	21.1	19.9	19.3	18.9	dB
S11	-18.3	-12.6	-12.5	-12.6	-13.4	dB
S22	-15.7	-9.7	-9.5	-9.2	-8.8	dB
Output P1dB	21.0	15.8	15.9	17.0	15.2	dBm
Output IP3 ¹⁾	32.4	30.1	29.5	28.7	27.4	dBm
Noise Figure	3.9	4.1	4.4	4.6	4.3	dB

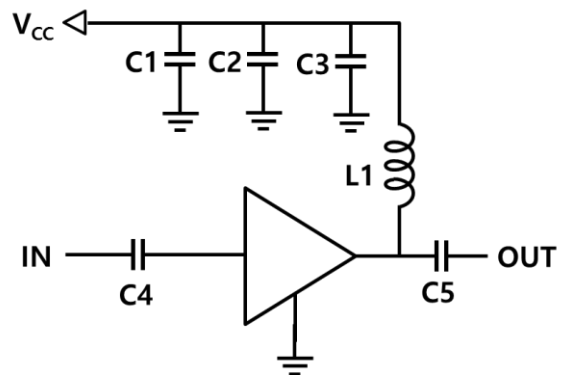
Notes:

1) OIP3:Pout = +7 dBm/tone, $\Delta f = 1\text{ MHz}$

Evaluation Board Information



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

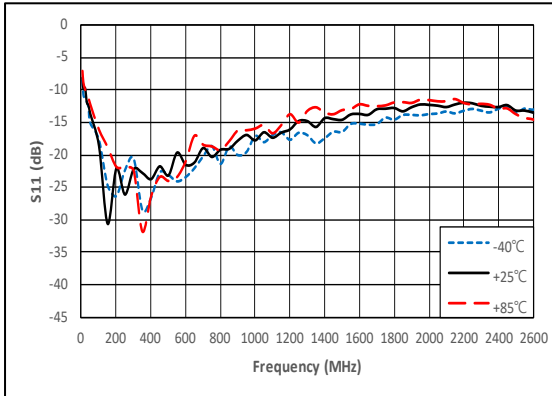


Component	Frequency
	20MHz ~ 2400MHz
L1	22uH
C4,C5	2.2uF
C1 / C2 / C3	10uF / 1000pF / 100pF

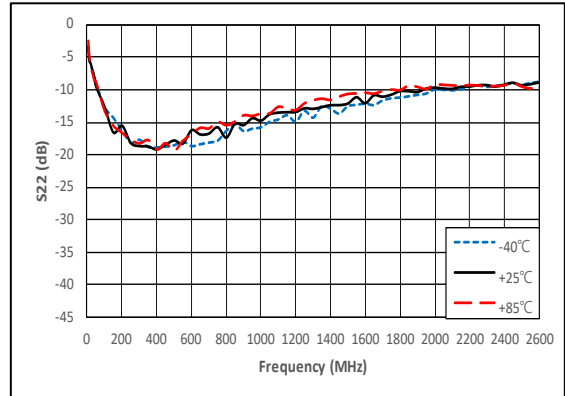
Performance Plots

20MHz ~ 2400MHz Application Circuit, $V_{CC} = +5V$, $Z_o = 50\Omega$

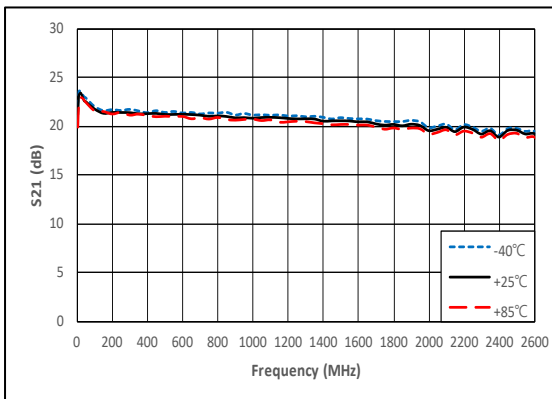
Input Return



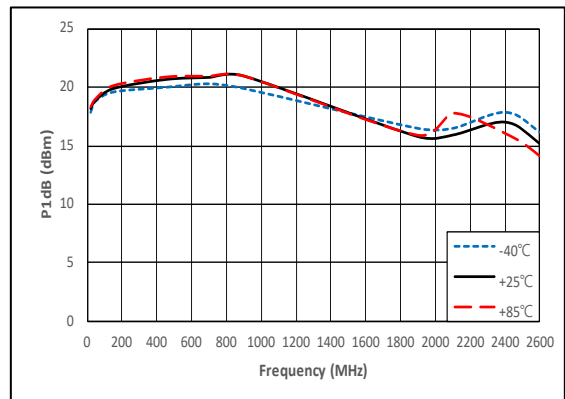
Output Return



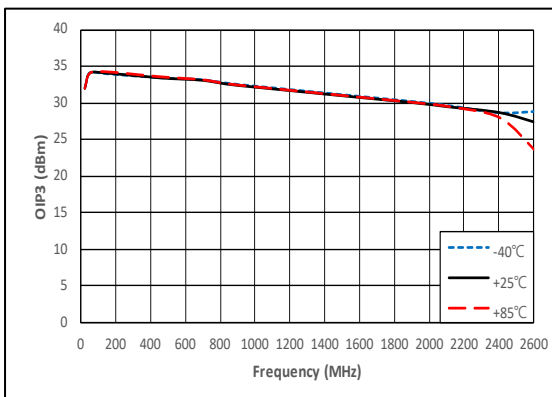
Gain



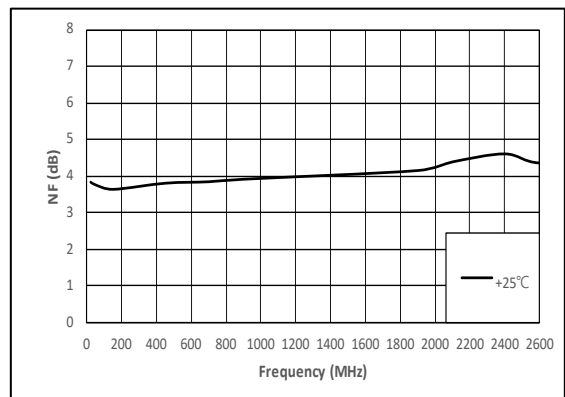
P1dB



OIP3 (@ 7dBm/Tone)



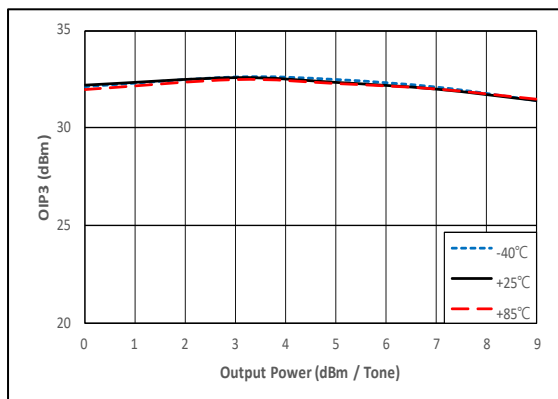
NF



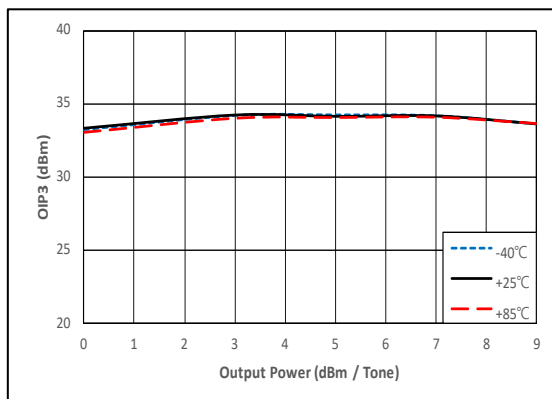
Performance Plots

20MHz ~ 2400MHz Application Circuit, $V_{CC} = +5V$, $Z_o = 50\Omega$

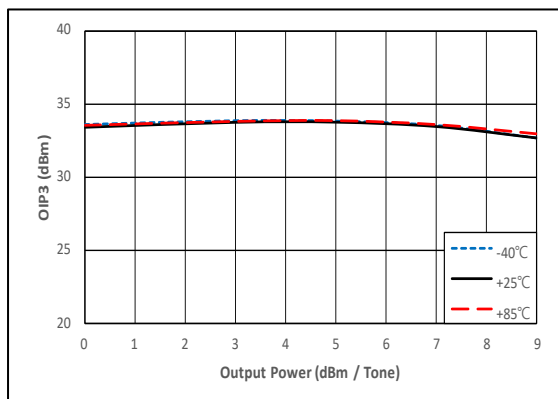
OIP3 (20MHz)



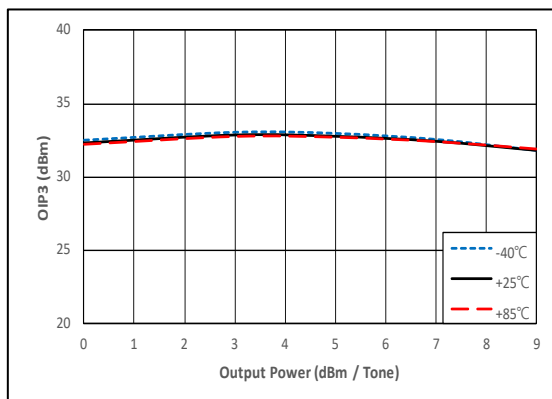
OIP3 (50MHz)



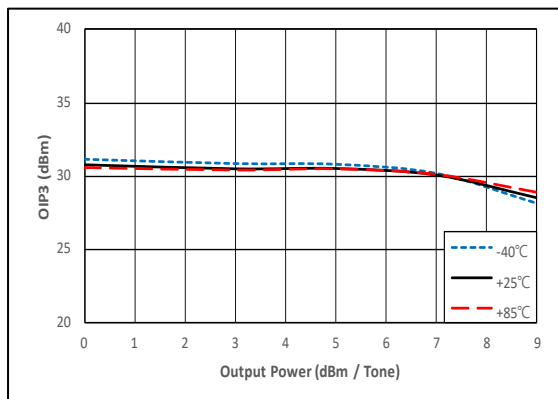
OIP3 (450MHz)



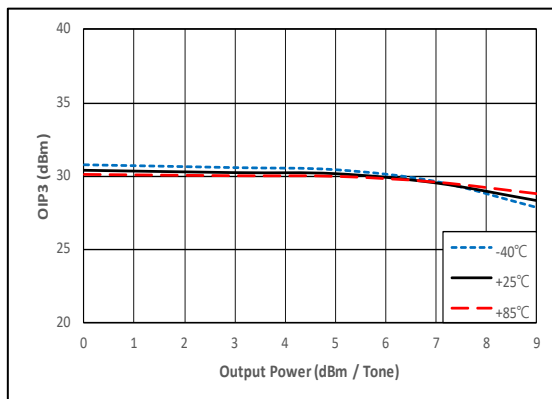
OIP3 (900MHz)



OIP3 (1900MHz)



OIP3 (2100MHz)



Typical RF Performance

500MHz ~ 2700MHz Application Circuit, $V_{CC} = +5V$, Temp. = $+25^{\circ}C$, $Z_0 = 50\Omega$

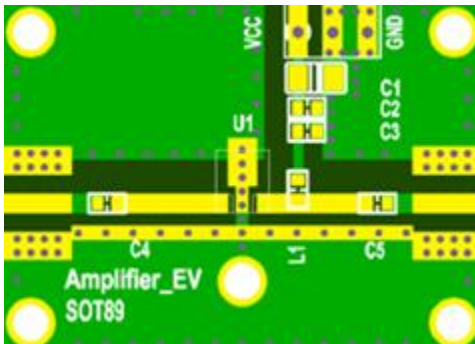
Frequency(MHz)	150	450	700	900	1900	2100	Units
S21	19.4	21.1	21.3	21.3	20.8	20.5	dB
S11	-3.7	-12.2	-18.1	-25.6	-19.1	-17.3	dB
S22	-5.1	-14.5	-21.8	-29.3	-19.2	-19.1	dB
Output P1dB	15.3	20.6	20.8	20.9	19.3	18.6	dBm
Output IP3 ¹⁾	26.8	34.0	34.7	34.3	31.6	30.8	dBm
Noise Figure	3.6	3.9	3.9	4.0	4.4	4.3	dB

Frequency(MHz)	2400	2600	3000	3300	3600	4000	Units
S21	20.4	20.4	20.4	20.3	20.0	18.8	dB
S11	-17.3	-17.2	-16.1	-14.9	-14.3	-14.1	dB
S22	-19.3	-19.6	-20.8	-18.0	-12.8	-8.4	dB
Output P1dB	17.9	17.5	15.9	14.9	13.7	11.8	dBm
Output IP3 ¹⁾	29.7	29.2	26.8	25.0	23.2	20.0	dBm
Noise Figure	4.5	4.5	4.4	4.6	4.5	4.6	dB

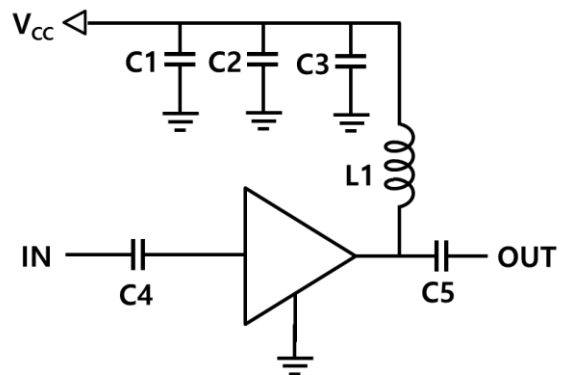
Notes:

1) OIP3: Pout = +7 dBm/tone, $\Delta f = 1\text{ MHz}$

Evaluation Board Information



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

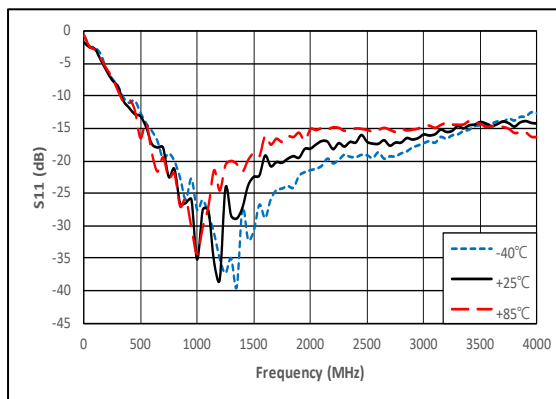


Component	Frequency
	500MHz ~ 2700MHz
L1	33nH
C4,C5	100pF
C1 / C2 / C3	10uF / 1000pF / 100pF

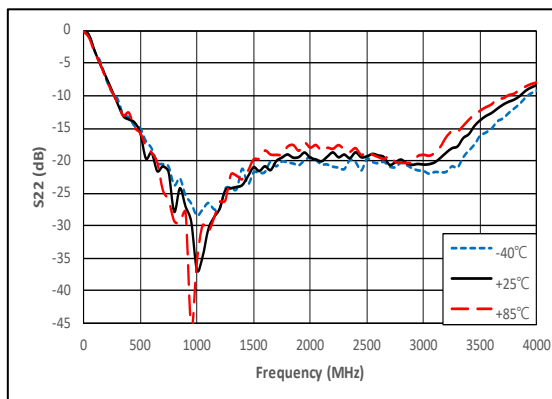
Performance Plots

500MHz ~ 2700MHz Application Circuit, $V_{CC} = +5V$, $Z_o = 50\Omega$

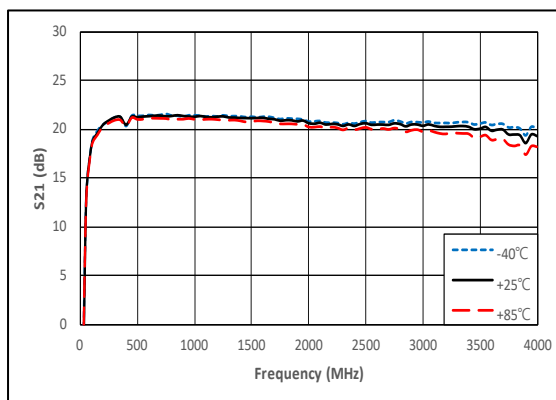
Input Return



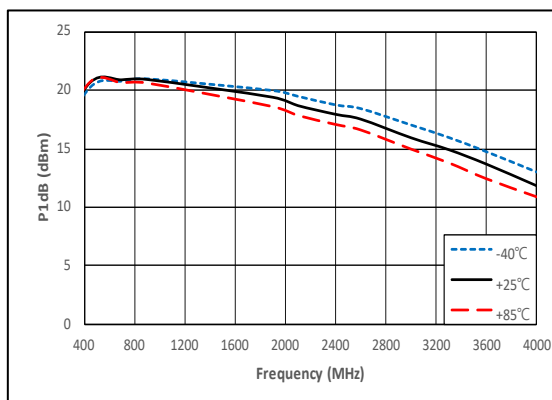
Output Return



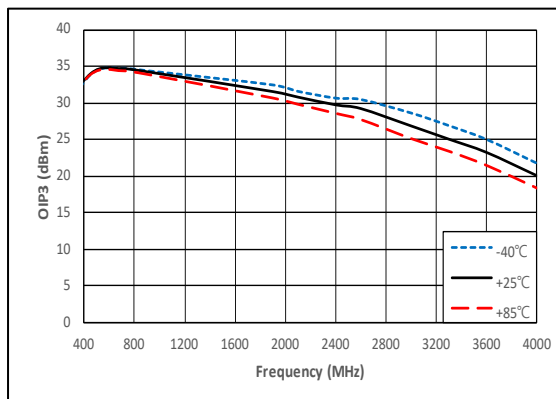
Gain



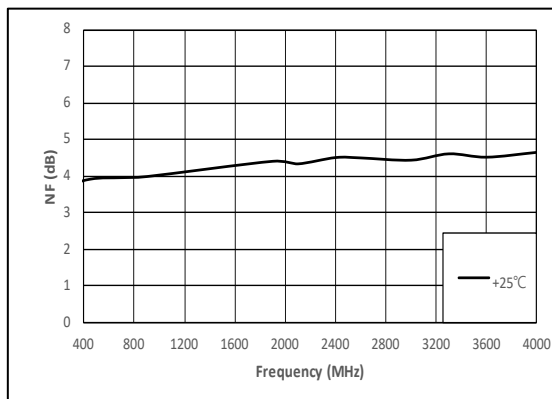
P1dB



OIP3 (@ 7dBm/Tone)



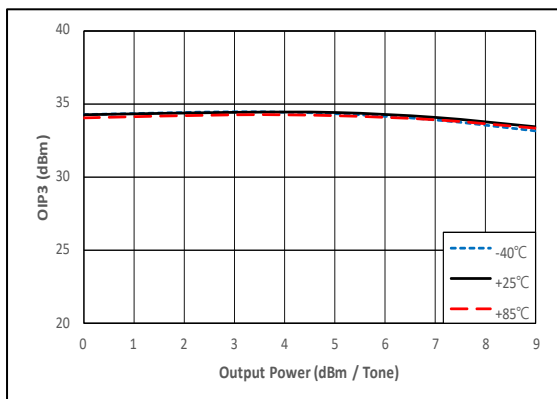
NF



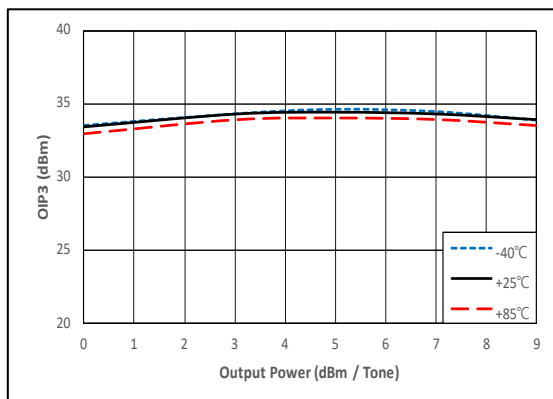
Performance Plots

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

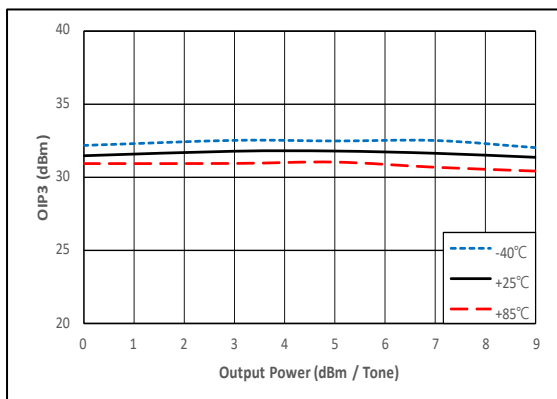
OIP3 (450MHz)



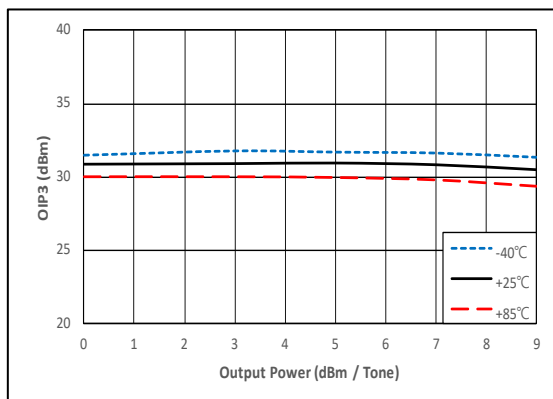
OIP3 (900MHz)



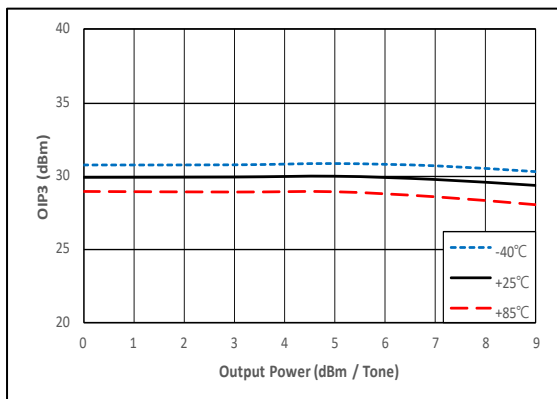
OIP3 (1900MHz)



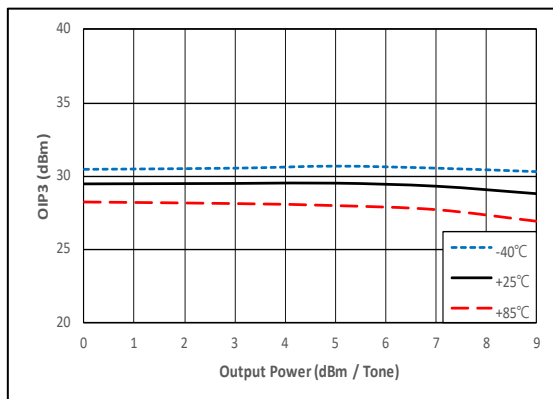
OIP3 (2100MHz)



OIP3 (2400MHz)



OIP3 (2600MHz)



Typical RF Performance

2600MHz ~ 3600MHz Application Circuit, $V_{CC} = +5V$, Temp. = $+25^{\circ}C$, $Z_0 = 50\Omega$

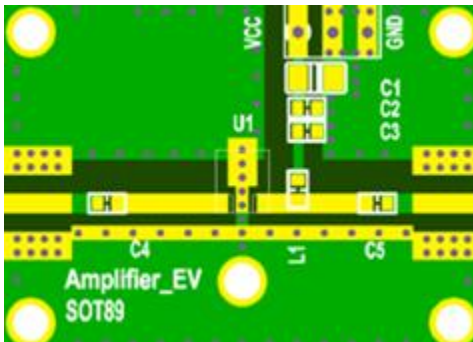
Frequency(MHz)	2400	2500	2600	2700	2800	2900	Units
S21	20.6	20.7	20.9	20.5	20.5	20.5	dB
S11	-18.9	-19.3	-21.5	-20.2	-18.8	-19.6	dB
S22	-19.2	-19.0	-18.8	-19.3	-19.8	-19.7	dB
Output P1dB	17.9	17.7	17.3	17.2	16.6	16.4	dBm
Output IP3 ¹⁾	29.9	29.6	29.0	28.6	27.9	27.7	dBm
Noise Figure	4.0	4.1	4.0	3.9	4.0	4.0	dB

Frequency(MHz)	3000	3100	3200	3300	3400	3600	Units
S21	20.8	20.3	20.2	20.1	19.9	19.7	dB
S11	-23.1	-20.4	-22.8	-23.3	-24.3	-44.3	dB
S22	-18.8	-19.8	-20.5	-20.1	-19.1	-17.4	dB
Output P1dB	16.0	15.7	15.4	15.1	14.7	14.4	dBm
Output IP3 ¹⁾	27.0	26.7	25.9	25.7	25.3	23.6	dBm
Noise Figure	4.1	4.1	4.1	4.1	4.5	4.0	dB

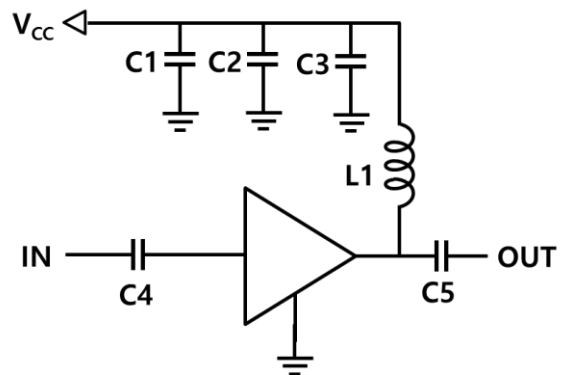
Notes:

1) OIP3: Pout = +7 dBm/tone, $\Delta f = 1\text{ MHz}$

Evaluation Board Information



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

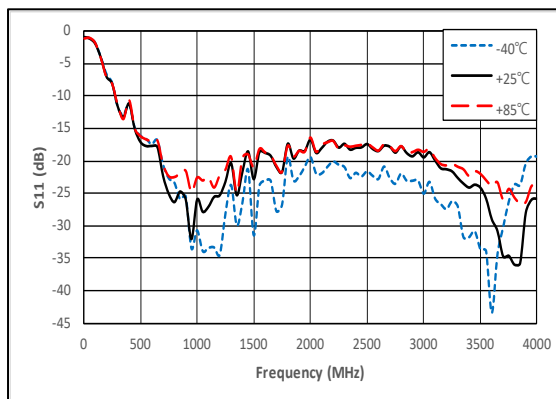


Component	Frequency
	2600MHz ~ 3600MHz
L1	39nH
C4,C5	39pF
C1 / C2 / C3	10uF / 1000pF / 100pF

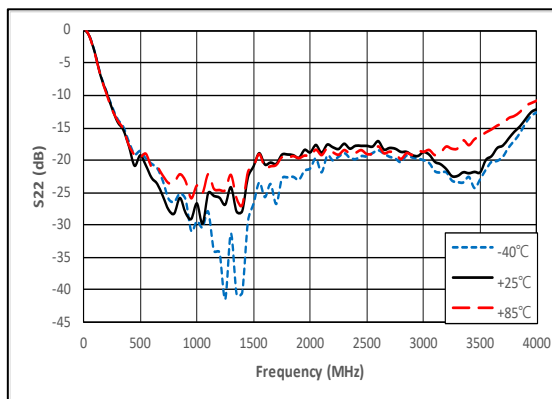
Performance Plots

2600MHz ~ 3600MHz Application Circuit, $V_{CC} = +5V$, $Z_0 = 50\Omega$

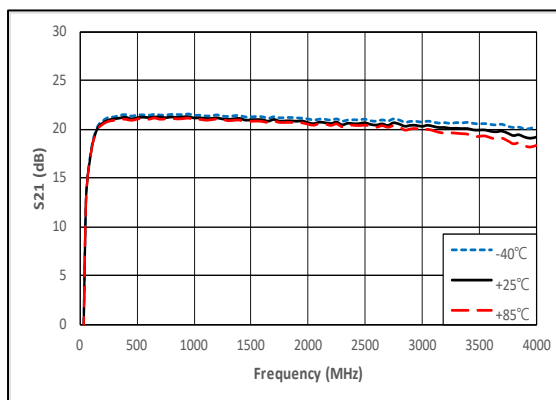
Input Return



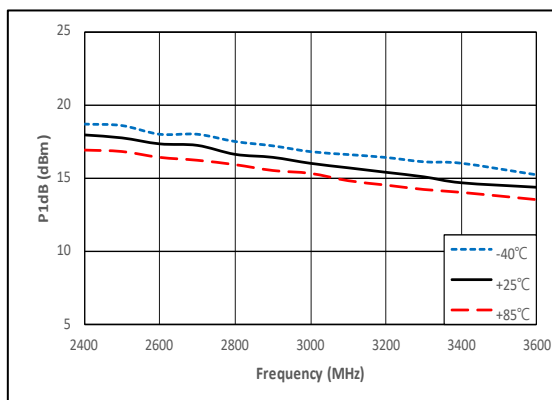
Output Return



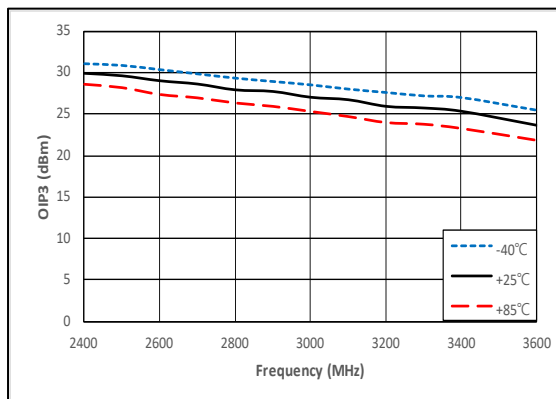
Gain



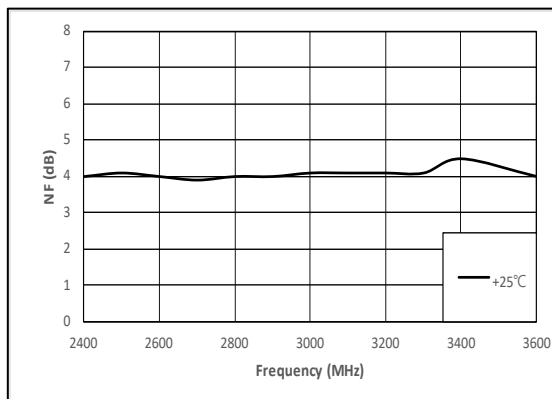
P1dB



OIP3 (@ 7dBm/Tone)



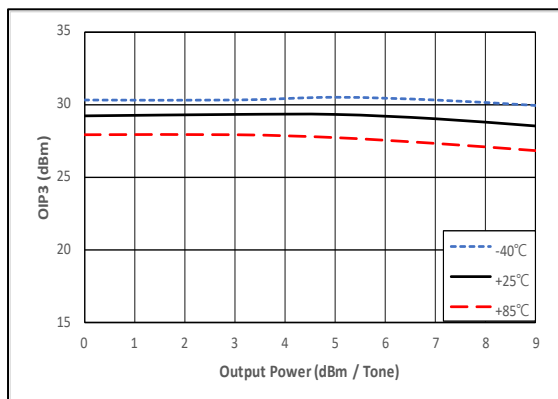
NF



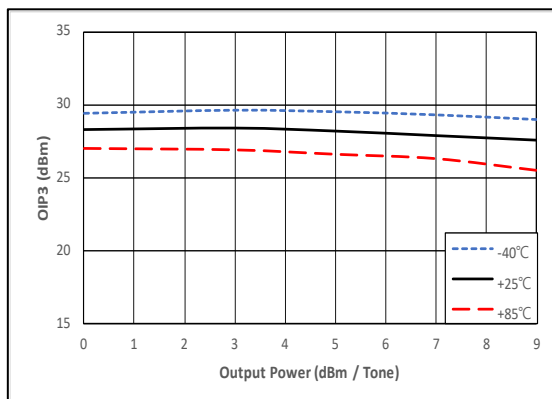
Performance Plots

2600MHz ~ 3600MHz Application Circuit, $V_{CC} = +5V$, $Z_o = 50\Omega$

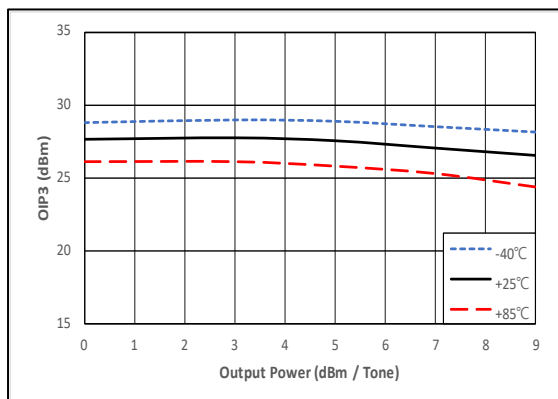
OIP3 (2600MHz)



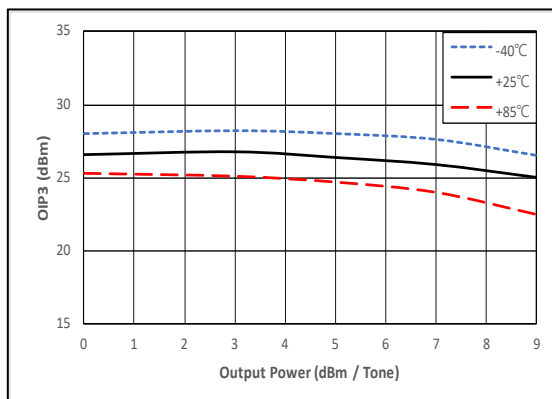
OIP3 (2800MHz)



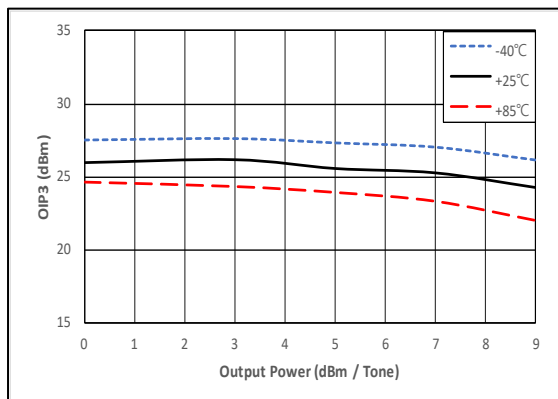
OIP3 (3000MHz)



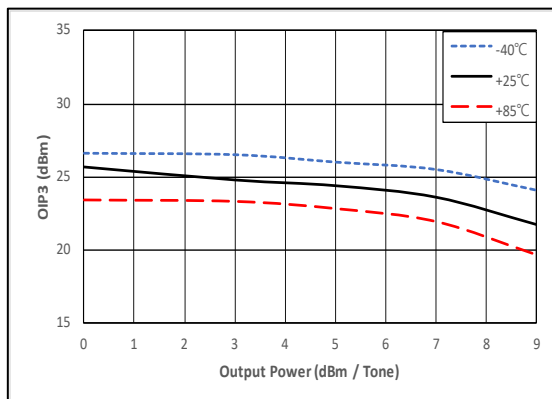
OIP3 (3200MHz)



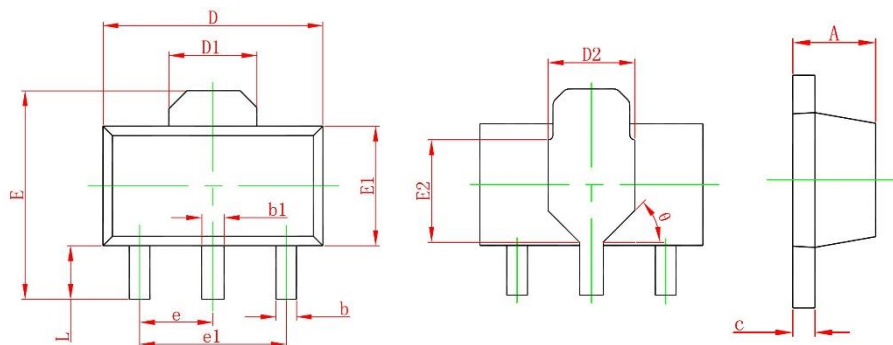
OIP3 (3400MHz)



OIP3 (3600MHz)

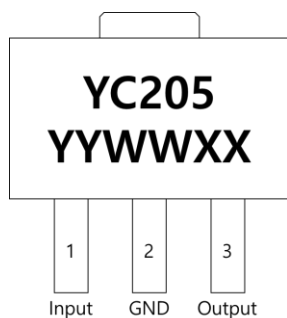


Package Outline Drawing



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	45°	
All Dimensions in mm		

Package Marking



P/N : YC205
 YY : Year
 WW : Week
 XX : Wafer No.

PCB Land Pattern

