YC202

20-4000MHz Gain Block Amplifier

Description

The YC202 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 3.5V supply, the YC202 does not require a dropping resistor as compared to typical Darlington amplifiers.

The YC202 product is designed for high linearity 3.5V 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=32.0dBm @900MHz
- P1dB=16.3dBm @900MHz
- Gain=20.5dB @900MHz
- Current Variation/temp=0.136mA/℃
- Internally matched to 50Ω
- SOT-363 Package
- RoHS Compliant/Lead-free

Electrical Specification

Parameter	Specification			Condition	Units
	Min.	Typ.	Max.		
Gain	19.5	20.5	21.5	900MHz	dB
	17.6	18.6	19.6	1950MHz	dB
	17.2	18.2	19.2	2140MHz	dB
Output P1dB	15.3	16.3		900MHz	dBm
	14.9	15.9		1950MHz	dBm
	14.9	15.9		2140MHz	dBm
Output IP3	30.0	32.0		900MHz	dBm
	26.4	28.4		1950MHz	dBm
	26.1	28.1		2140MHz	dBm
Input Return Loss	-18.0	-16.0		1950MHz	dB
Output Return Loss	-19.9	-17.9		1950MHz	dB
Reverse Isolation	-24.7	-22.7		1950MHz	dB
Noise Figure		2.5		1950MHz	dB
Device Voltage		3.5			V
Device Current	50	55	58		mA
Thermal Resistance		63.1			°C/W

Notes:
1) VCC = +3.5 V, Temp. = +25 °C, Zo=50Ω, OIP3:Pout = 0 dBm/tone, Δf = 1 MHz

Recommended Operating Condition

Parameter	Min	Typ	Max	Units
Device Voltage		3.5		V
Operating Temperature	-40	25	85	°C
Junction Temperature	-		188	°C

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage	4.5	V
Supply Current	180	mA
Storage Temperature	-55~+150	°C
RF Input Power	15	dBm

Typical RF Performance

Frequency(MHz)	50	150	450	700	850	900	1227	1575	1850	1900	Units
S21	22.5	21.9	21.4	20.8	20.6	20.5	19.9	18.7	18.7	18.9	dB
S11	-9.7	-17.0	-23.0	-18.7	-17.5	-17.2	-15.8	-15.7	-15.7	-15.8	dB
S22	-11.3	-16.6	-21.6	-13.5	-13.9	-14.4	-16.0	-17.0	-17.0	-16.8	dB
Output P1dB	14.9	16.4	16.5	16.4	16.4	16.3	16.3	16.0	16.0	16.0	dBm
Output IP3	32.6	31.4	31.1	31.8	32.4	32.0	29.3	29.3	29.3	28.3	dBm
Noise Figure	2.0	2.1	2.0	2.2	2.4	2.2	2.4	2.5	2.5	2.5	dB

Frequency(MHz)	1960	2100	2140	2350	2400	2600	2700	3000	3300	3500	Units
S21	18.6	18.4	18.2	17.7	17.7	17.1	16.9	16.5	16.2	15.9	dB
S11	-15.8	-16.5	-16.2	-16.5	-16.6	-16.6	-16.8	-16.5	-16.8	-16.6	dB
S22	-17.5	-18.2	-19.0	-20.7	-19.9	-21.8	-23.3	-30.6	-27.2	-22.8	dB
Output P1dB	15.9	15.9	15.9	15.8	15.5	15.4	15.5	15.3	15.0	14.0	dBm
Output IP3	28.4	27.7	28.1	27.6	27.2	25.8	25.8	25.0	25.7	24.3	dBm
Noise Figure	2.5	2.5	2.6	2.4	2.4	2.5	2.5	2.6	2.4	2.3	dB

MSL Rating

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

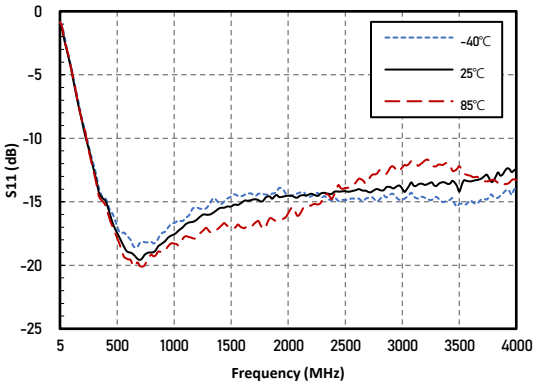
ESD Sensitivity Ratings

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

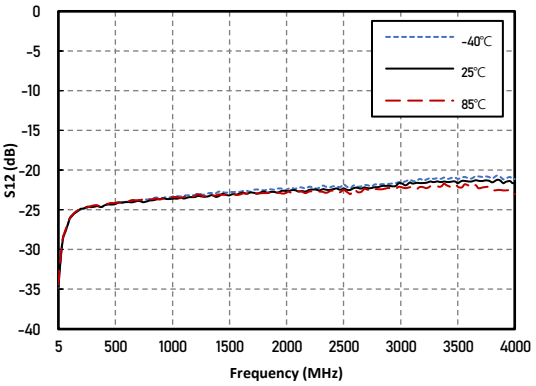
Performance Plots

V_{CC} = +3.5V, I_C = 55mA, T = 25℃, Z_O = 50Ω

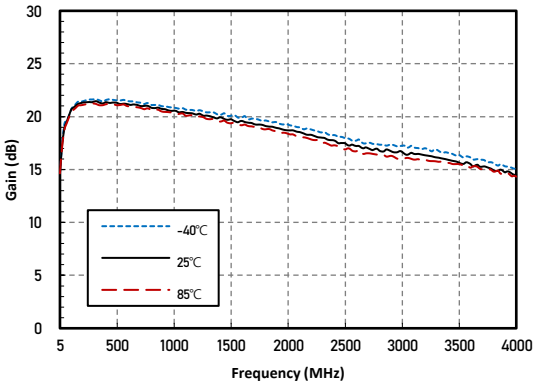
Input Return



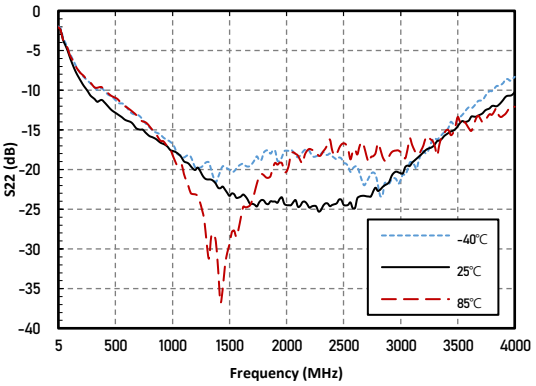
Isolation



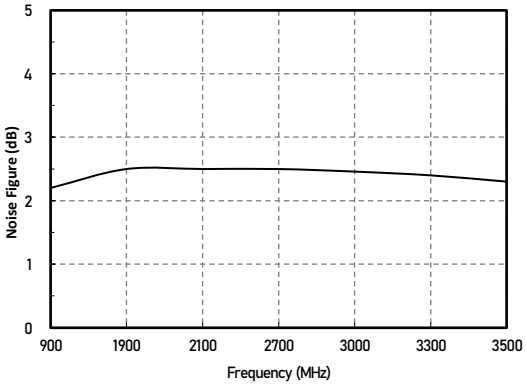
Gain



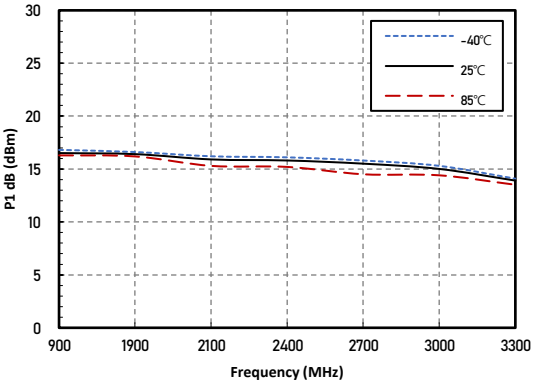
Output Return



Noise Figure



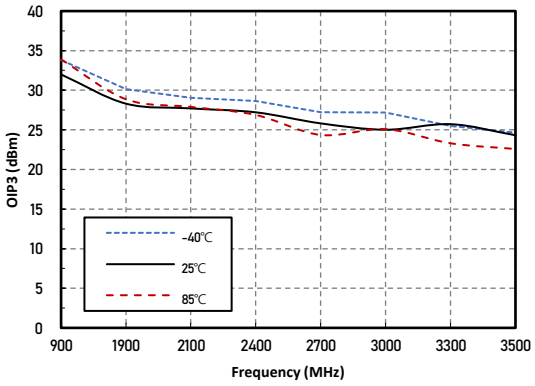
P1dB vs. Frequency



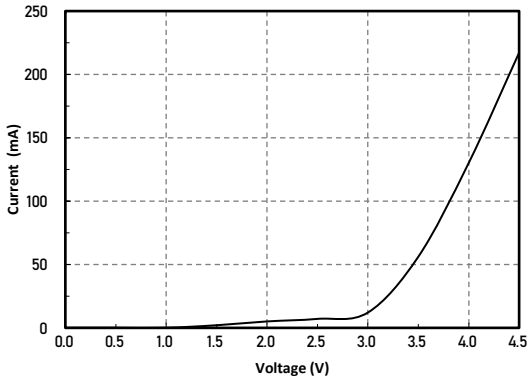
Performance Plots

V_{CC} = +3.5V, I_C = 55mA, T = 25℃, Z_O = 50Ω

OIP3 vs. Temperature (P_{OUT} : 0dBm/tone)

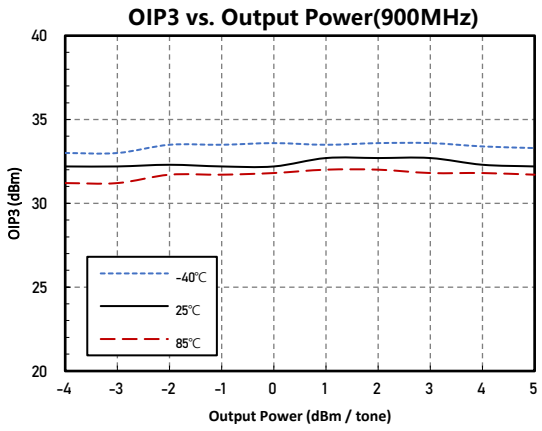


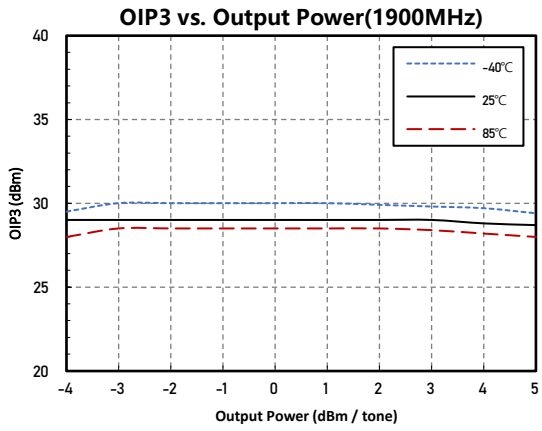
I-V Curve

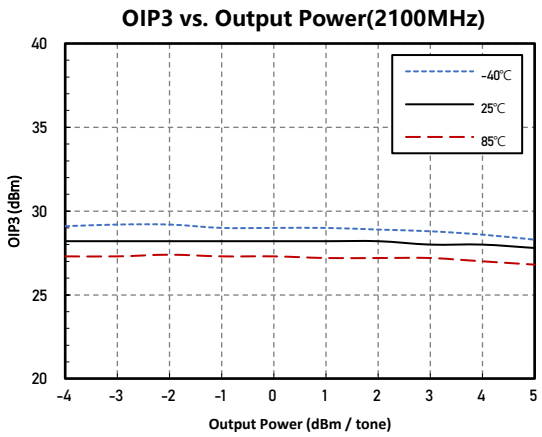


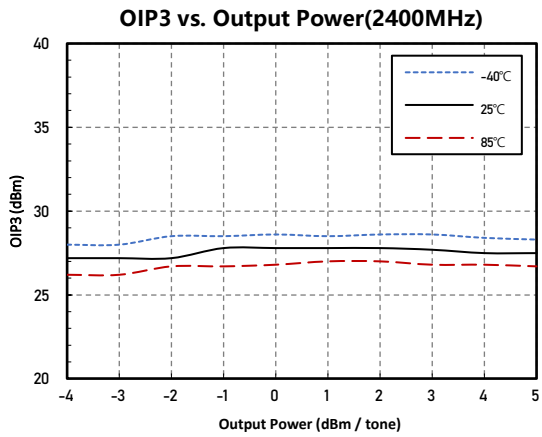
Performance Plots

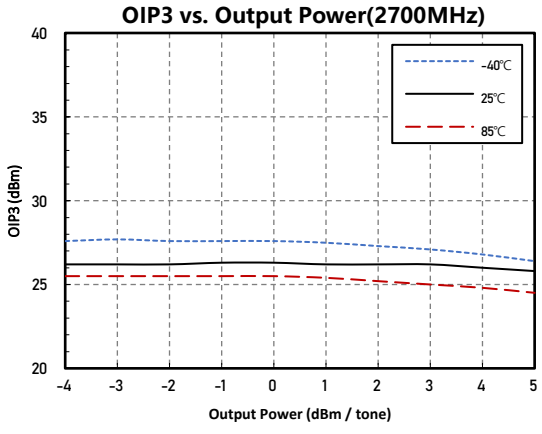
V_{CC} = +3.5V, I_C = 55mA, T = 25℃, Z_O = 50Ω

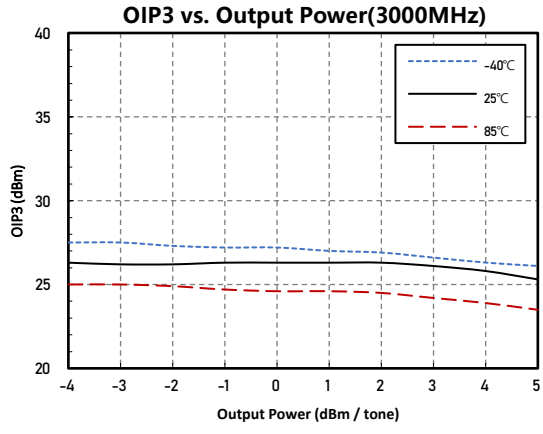




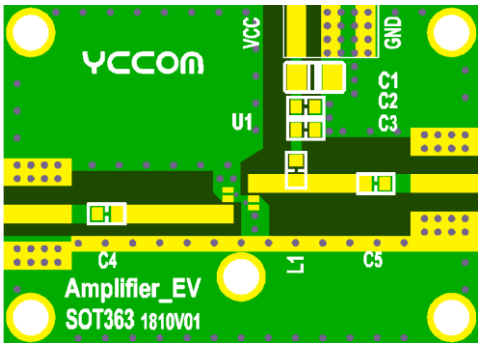






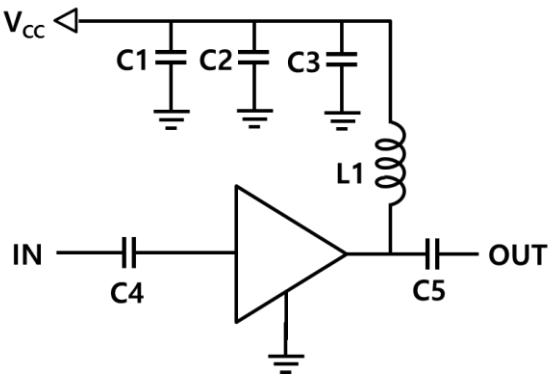


Evaluation Board PCB Information



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

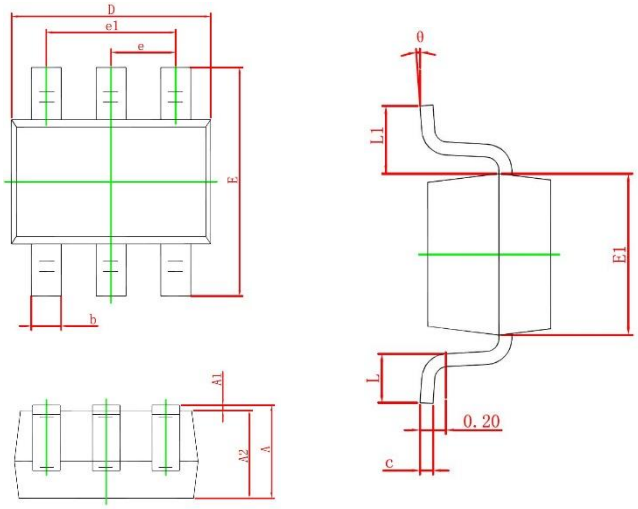
Application Circuit



Suggested Component Values for Key Application Frequencies

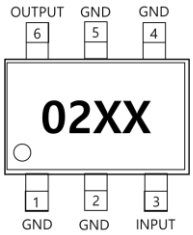
Component	Frequency(MHz)			
	20	500	500~2700	3500
L1	22uH	2.7uH	33nH	8.2nH
C4,C5	2.2uF	1000pF	100pF	100pF
C1 / C2 / C3	10uF / 1000pF / 100pF			

Package Outline Drawing



SOT-363		
Symbol	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.110	0.175
D	2.000	2.200
E	2.150	2.450
E1	1.150	1.350
e	0.650 TYP	
e1	1.200	1.400
L	0.260	0.460
L1	0.525REF	
θ	0º	8º
All Dimensions in mm		

Package Marking



P/N : YC202
XX : Wafer No.

PCB Land Pattern