

20-4000MHz Gain Block Amplifier



Description

The YC203 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 3.3V supply, the YC203 does not require a dropping resistor as compared to typical Darlington amplifiers.

The YC203 product is designed for high linearity 3.3V 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=29.6dBm @900MHz
- ◆ P1dB=20.9dBm @900MHz
- ◆ Gain=21.5dB @900MHz
- ◆ Internally matched to 50 Ω
- ◆ SOT-363 Package
- ◆ RoHS Compliant/Lead-free

Test conditions: VCC = +3.3 V, Temp. = +25 $^{\circ}$ C, Zo=50 Ω , OIP3:Pout = 0 dBm/tone, Δ f = 1 MHz

Parameter	Specification			Condition	Units
	Min.	Typ.	Max.		
Gain	20.5	21.5	22.5	900MHz	dB
	15.6	16.6	17.6	1900MHz	dB
	14.8	15.8	16.8	2100MHz	dB
Output P1dB	19.9	20.9		900MHz	dBm
	19.4	20.4		1900MHz	dBm
	19.3	20.3		2100MHz	dBm
Output IP3	32.0	34.0		900MHz	dBm
	30.8	32.8		1900MHz	dBm
	31.2	33.2		2100MHz	dBm
Input Return Loss	-14.0	-12.0		1900MHz	dB
Output Return Loss	-15.2	-13.2		1900MHz	dB
Reverse Isolation	-27.0	-25.0		1900MHz	dB
Noise Figure		2.4	2.9	1900MHz	dB
Device Voltage		* 3.3			V
Device Current	21	28	31		mA
Thermal Resistance		47.9			$^{\circ}$ C/W

*YC203 is recommended for use at 3.25V to 3.35V. If the voltage will be over the range, linearity problems may be occurred.

20-4000MHz Gain Block Amplifier

Recommended Operating Condition

Parameter	Min	Typ	Max	Units
Device Voltage		3.3		V
Operating Temperature	-40	25	85	°C
Junction Temperature	-		168	°C

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage	5	V
Supply Current	125	mA
Storage Temperature	-55~150	°C
RF Input Power	24	dBm

Typical RF Performance

Test conditions: VCC = +3.3 V, Temp. = +25 °C, OIP3:Pout = 0 dBm/tone, Δf = 1 MHz

Frequency(MHz)	50	150	450	700	900	1900	Units
S21	26.6	26.3	24.4	22.5	21.5	16.6	dB
S11	-18.1	-17.0	-15.1	-14.1	-11.1	-12.0	dB
S22	-11.9	-12.1	-12.2	-12.2	-14.8	-13.2	dB
Output P1dB	20.8	20.6	20.3	19.9	20.9	20.4	dBm
Output IP3	27.5*	27.0*	25.8	25.4	29.6	31.5	dBm
Noise Figure	1.7	1.7	1.8	1.8	1.9	2.4	dB

Frequency(MHz)	2100	2400	2700	3000	3300	3500	Units
S21	15.8	15.3	14.4	12.8	13.0	11.9	dB
S11	-12.9	-14.7	-17.2	-21.7	-26.43	-23.9	dB
S22	-12.1	-10.1	-8.8	-7.9	-8.1	-8.0	dB
Output P1dB	20.3	20.3	19.9	19.0	19.0	19.1	dBm
Output IP3	30.3	31.5	30.0	28.2	28.2	29.0	dBm
Noise Figure	2.3	2.3	2.4	2.4	2.5	2.6	dB

*Test conditions: VCC = +3.3 V, Temp. = +25 °C, OIP3:Pout = -4 dBm/tone, Δf = 1 MHz

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 1B

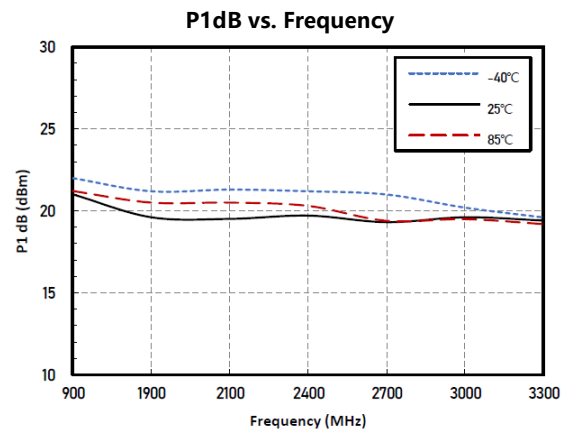
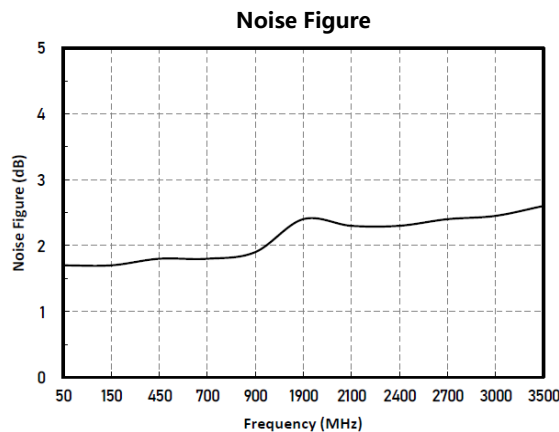
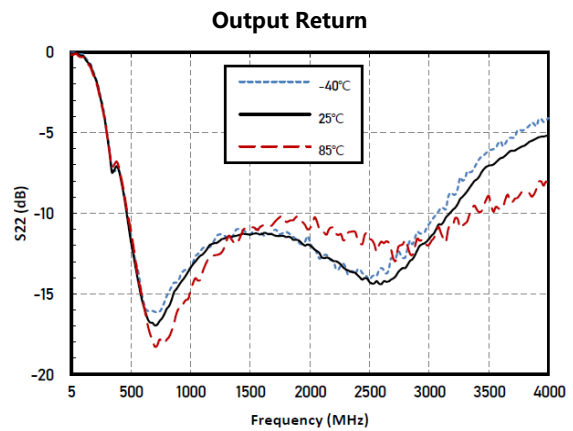
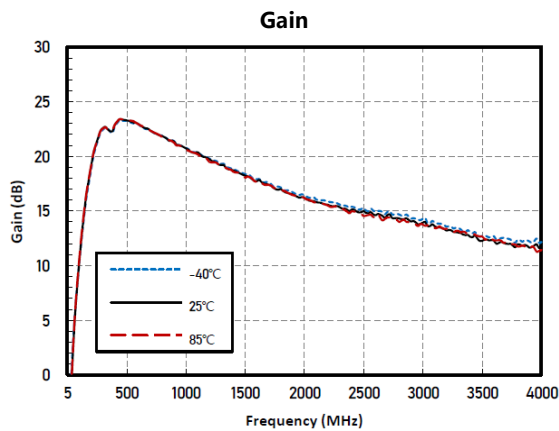
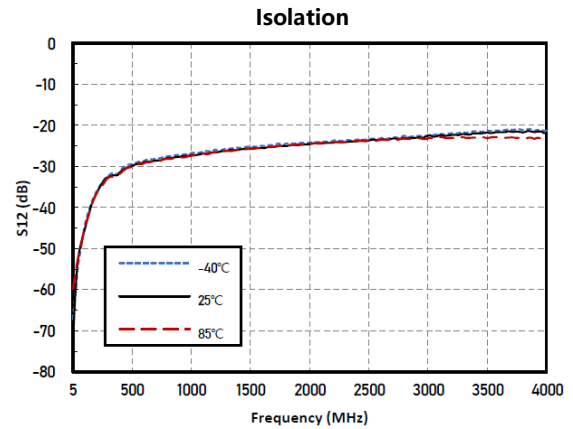
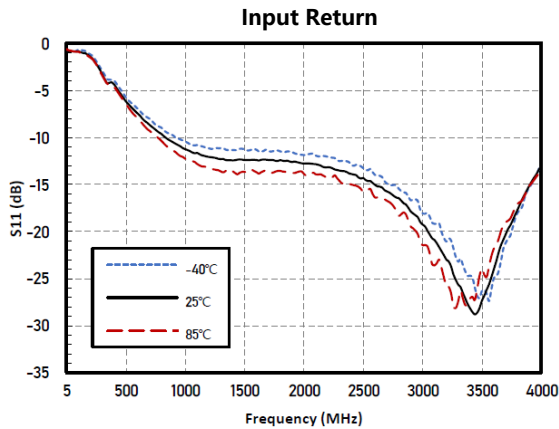
Test : Human Body Model (HBM)

Standard : JEDEC Standard JS-001-2012



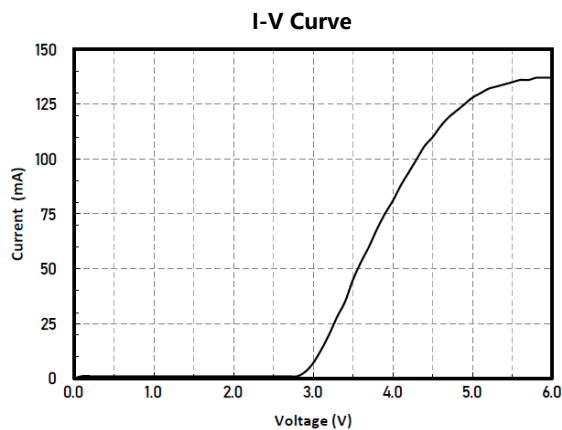
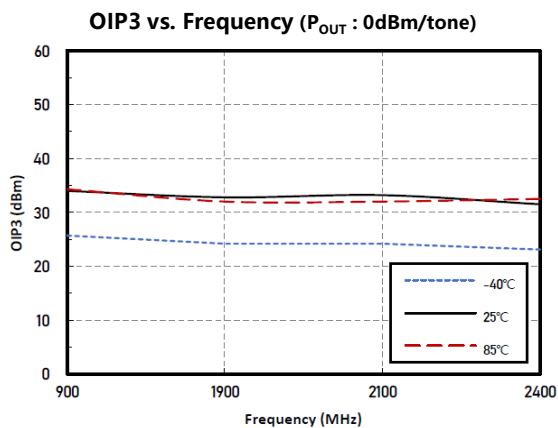
Performance Plots

$V_{CC} = +3.3V$, $I_C = 28mA$, $T = 25^\circ C$, $Z_O = 50\Omega$



Performance Plots

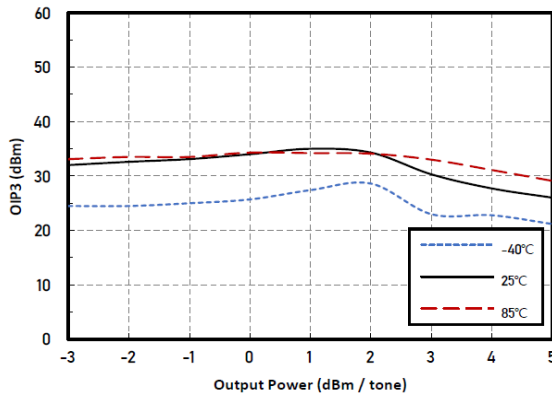
$V_{CC} = +3.3V$, $I_C = 28mA$, $T = 25^{\circ}C$, $Z_O = 50\Omega$



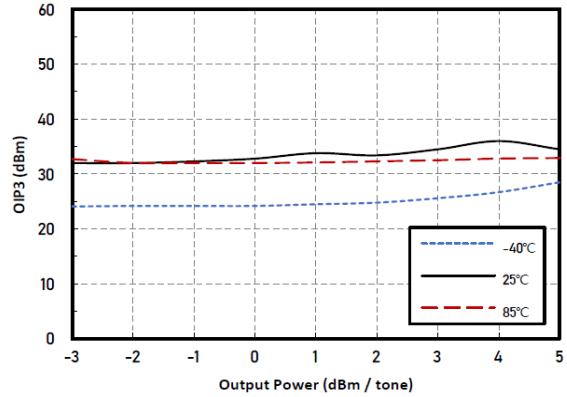
Performance Plots

$V_{CC} = +3.3V$, $I_C = 28mA$, $T = 25^\circ C$, $Z_O = 50\Omega$

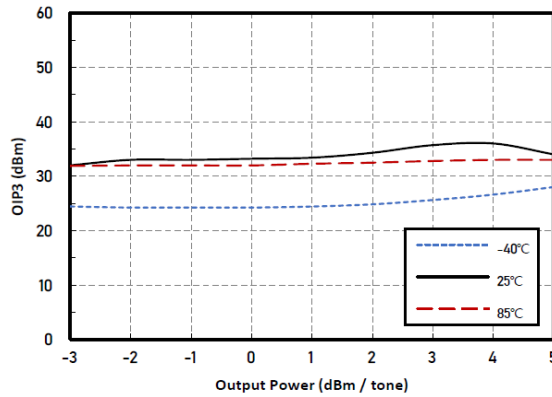
OIP3 vs. Output Power (900MHz)



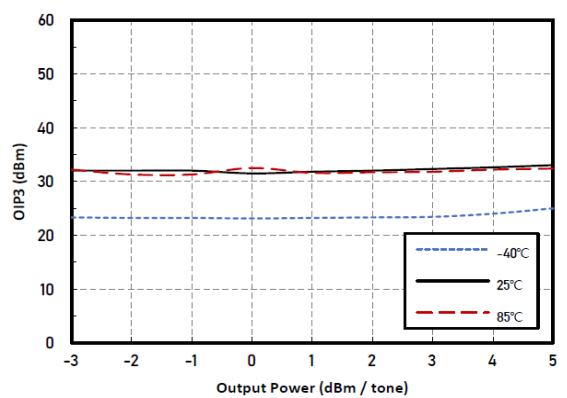
OIP3 vs. Output Power (1900MHz)



OIP3 vs. Output Power (2100MHz)

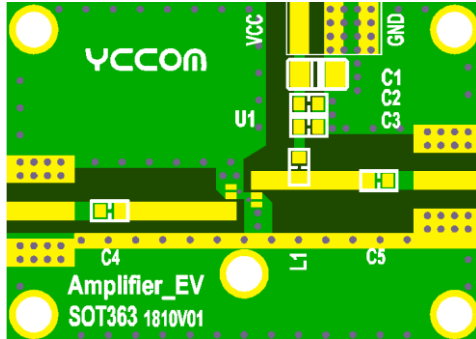


OIP3 vs. Output Power (2400MHz)



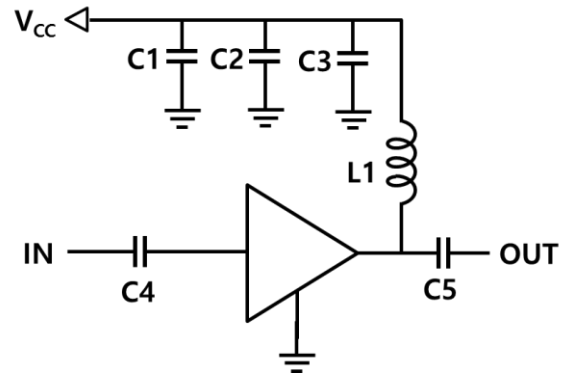
20-4000MHz Gain Block Amplifier

Evaluation Board PCB Information



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

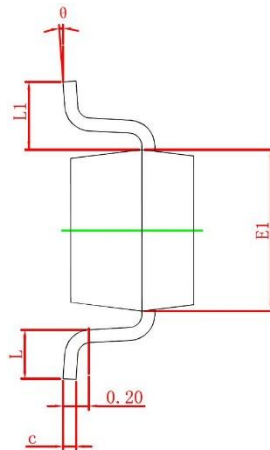
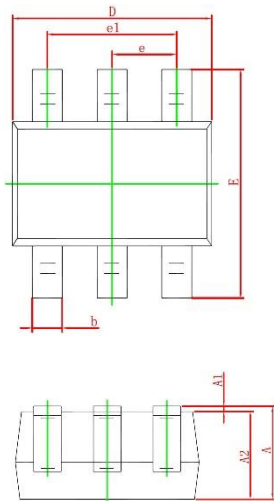
Application Circuit



Suggested Component Values for Key Application Frequencies

Component	Frequency(MHz)	
	50 ~ 700	900 ~ 3500
L1	3.3uH	18nH
C4,C5	820pF	10pF
C1 / C2 / C3	10uF / 1000pF / 100pF	

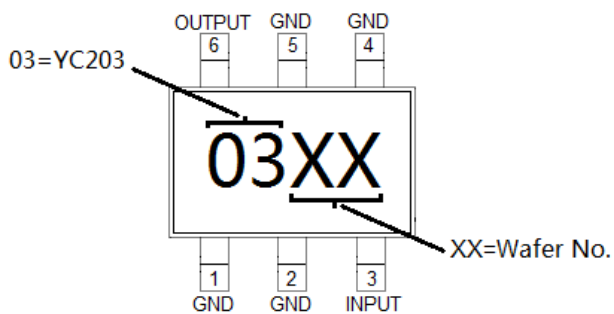
Package Outline Drawing



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	0°	8°
All Dimensions in mm		

20-4000MHz Gain Block Amplifier

Package Marking



PCB Land Pattern

