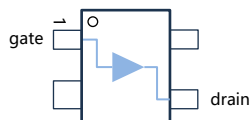




Description

YC114 is a high dynamic range, very low noise, single supply pHEMT housed in a 4-lead SC-70 (SOT-343) surface mount plastic package.

The combination of high gain, high linearity and low noise makes the YC114 ideal for cellular/PCS hand-sets, wireless data systems (WLL/RLL, WLAN and MMDS) and other systems in the 100 MHz to 5000 MHz frequency range.



Applications

- ◆ BDS/GPS/GNSS radio receivers
- ◆ Global Navigation Satellite Systems
- ◆ Personal navigation devices
- ◆ Cellular/PCS base stations
- ◆ WLAN, WLL/RLL and MMDS application
- ◆ General purpose discrete pHEMT for other ultra low noise applications

Features

- ◆ NF = 0.9dB @139 MHz
- ◆ Gain = 16dB @1700 MHz
- ◆ SOT343 Surface Mount Plastic Package
- ◆ RoHS2 Compliant/Lead-free

Electrical Specification

Parameter	Specification			Conditions	Unit
	Min.	Typ.	Max.		
Operational Frequency Range	100		5000		MHz
Test Frequency	155				MHz
Gain		21.9		$I_{DD}=10mA$	dB
Noise Figure		1.0		$I_{DD}=10mA$	dB
P1dB		16.8		$I_{DD}=10mA$	dBm
OIP3		29.5		$I_{DD}=10mA@5dBm/ tone$	dBm
Test Frequency	1700				MHz
Gain		16.1		$I_{DD}=10mA$	dB
Noise Figure		1.2		$I_{DD}=10mA$	dB
P1dB		19.3		$I_{DD}=10mA$	dBm
OIP3		25.5		$I_{DD}=10mA@5dBm/ tone$	dBm
Test Frequency	4200				MHz
Gain		11.7		$I_{DD}=11mA$	dB
Noise Figure		1.0		$I_{DD}=11mA$	dB
P1dB		17.4		$I_{DD}=11mA$	dBm
OIP3		25.6		$I_{DD}=11mA@5dBm/ tone$	dBm
DC Characteristics	DC				-
Device Voltage		3.3			V
Current (I_{DD})		12			mA
Thermal Resistance		63.3			$^{\circ}C/W$

Notes:

- 1) Test conditions unless otherwise noted : VDD = 3.3V, Temp. = 25 $^{\circ}C$, $Z_0 = 50\Omega$
- 2) Adjust the gain by adjusting the feedback resistance.

Recommended Operating Condition

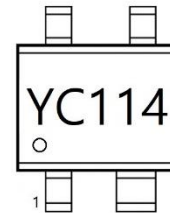
Parameter	Min	Typ	Max	Units
Device Voltage (V_{DD})	2.7	3.3	5.5	V
Operating Temperature	-40	25	85	°C
Storage Temperature	-55		150	°C

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage (V_{DD})	6	V
Supply Current	100	mA
Junction Temperature	180	°C
RF Input Power, CW, 50ohm, T=25°C, On/OFF Mode	25	dBm

Pin Configuration

Pin No.	Label	Description
1	Gate	RF input and gate bias (VGG) pin.
2 & 4	GND	DC and RF Ground pin.
3	Drain	RF output and drain bias (VDD) pin.

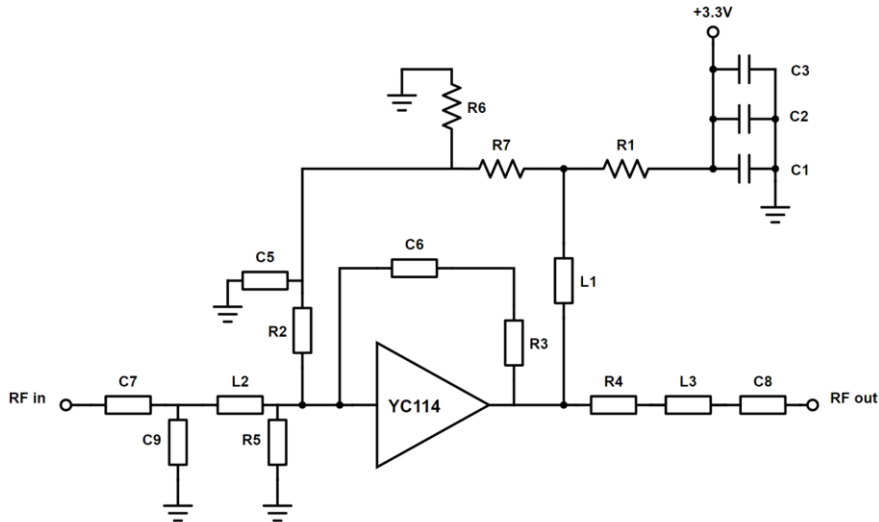


ESD Sensitivity Rating

Parameter	Rating	Standard
Charged Device Model (CDM)	Class C3	JEDEC JS-002
Human Body Model (HBM)	Class 1A	JEDEC JS-001



Application Circuit (136~174MHz)



Code	C1	C2	C3	C5	C6	C7	C8	C9	L1	L2	L3	R1	R2	R3	R4	R5	R6	R7
Value	100	1	10	10	1	1	22	2	120	47	0	0	470	1.8	0	10	680	5.1
Unit	pF	nF	uF	uF	nF	nF	pF	pF	nH	nH	Ω	Ω	nH	kΩ	Ω	pF	Ω	kΩ

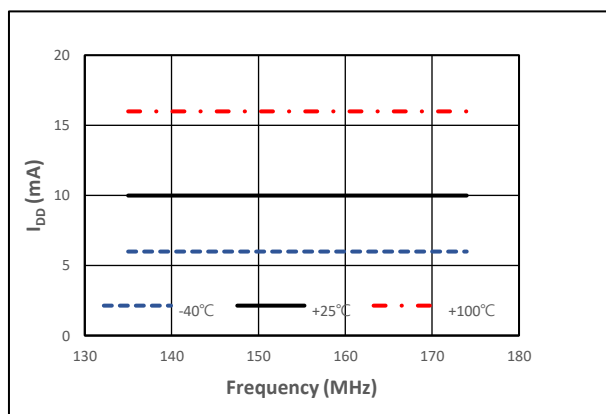
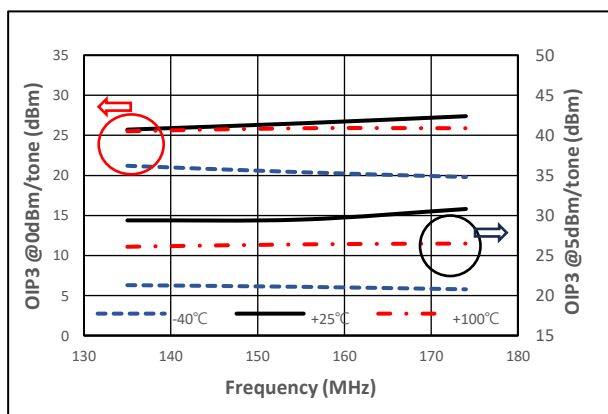
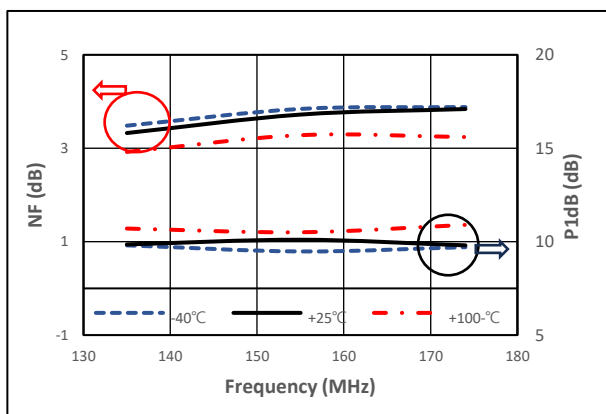
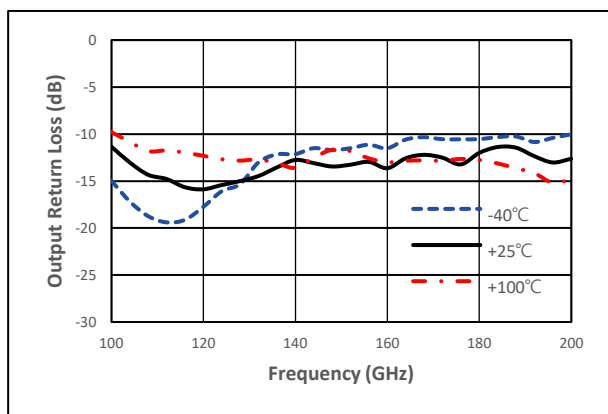
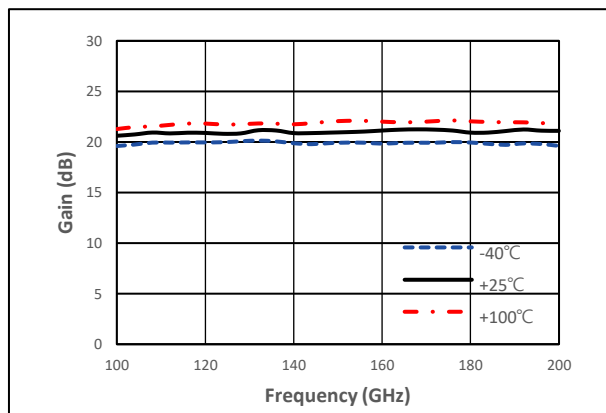
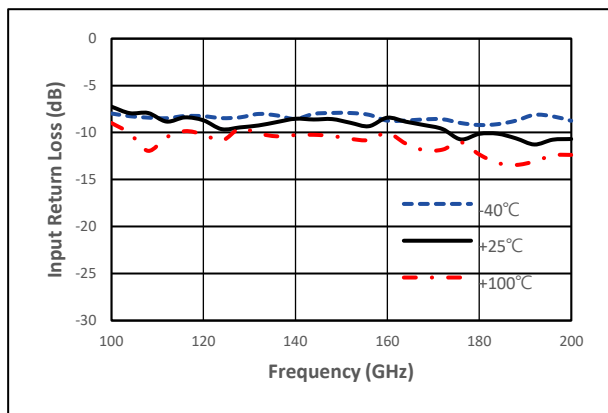
Note:

- 1) R6/R7 ratio sets the current draw. Can be changed for the desired bias point.
- 2) The current may vary under the same conditions according to Vth.
- 3) Gain can be changed by adjusting the feedback resistance and capacitance (R4 and C6).

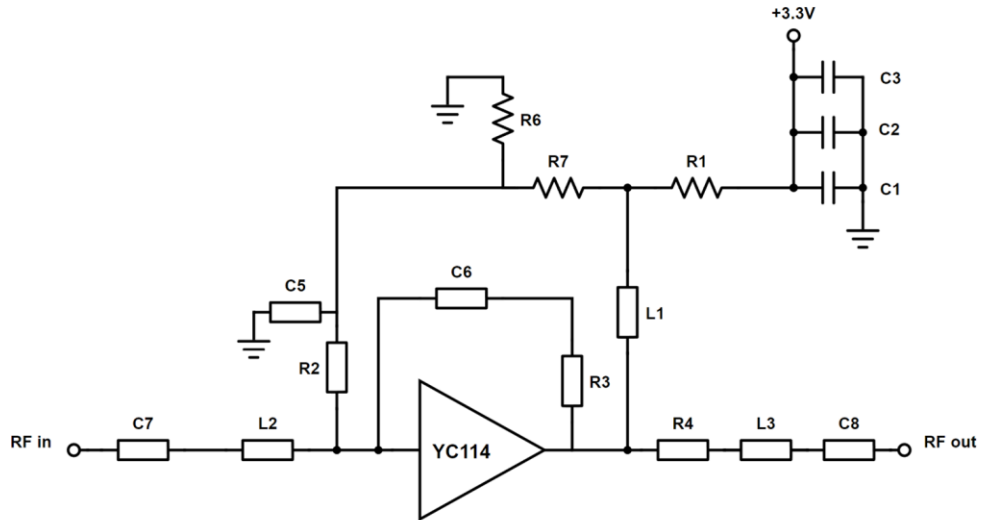
Typical RF Performance (136~174MHz)

Parameter	Unit	Typical RF Performance (@25°C)					
Frequency	MHz	135	155	174	135	155	174
I _{DD}	mA	10	10	10	25	25	25
Gain	dB	21.8	21.9	21.8	23.4	23.6	23.7
Input Return Loss	dB	-10.1	-10.5	-10.8	-17.7	-18.9	-24.1
NF	dB	0.9	1.0	0.9	0.9	1.1	0.8
P1dB	dBm	15.8	16.8	17.1	15.5	16.2	16.2
OIP3 (@0dBm/tone)	dBm	25.7	26.5	27.4	27.8	28.1	27.9
OIP3 (@5dBm/tone)	dBm	29.4	29.5	30.8	28.3	28.2	28.1

Performance Plots (136~174MHz)



Application Circuit (136~527MHz)



Code	C1	C2	C3	C5	C6	C7	C8	L1	L2	L3	R1	R2	R3	R4	R6	R7
Value	100	1	10	10	100	100	100	120	8.2	100	0	120	1.8	100	680	5.1
Unit	pF	nF	uF	uF	pF	pF	pF	nH	nH	pF	Ω	nH	kΩ	pF	Ω	kΩ

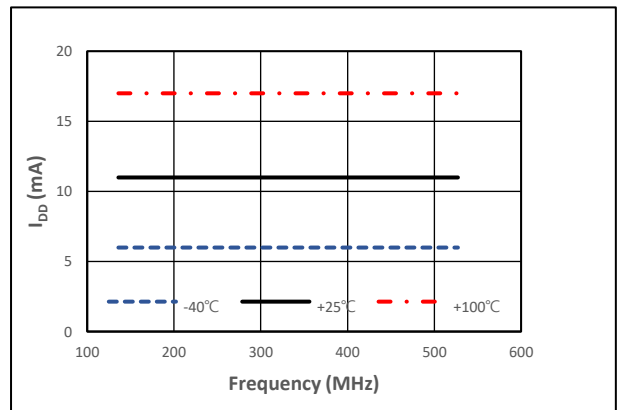
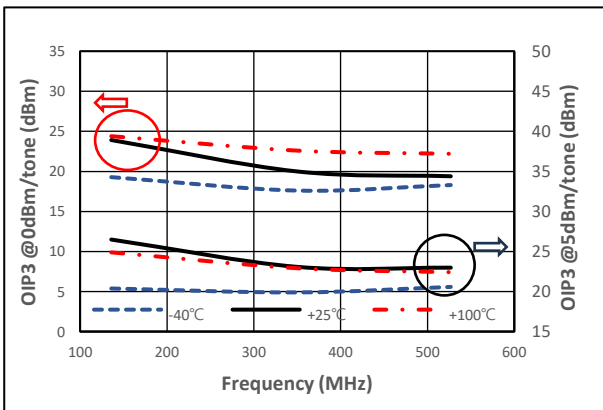
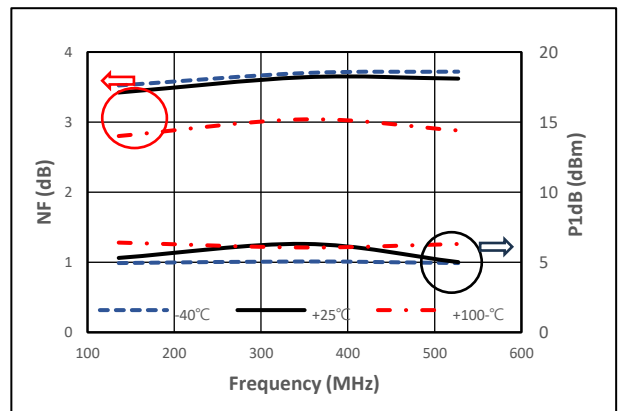
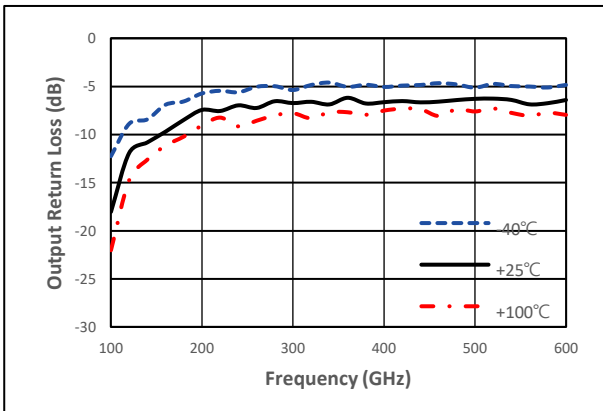
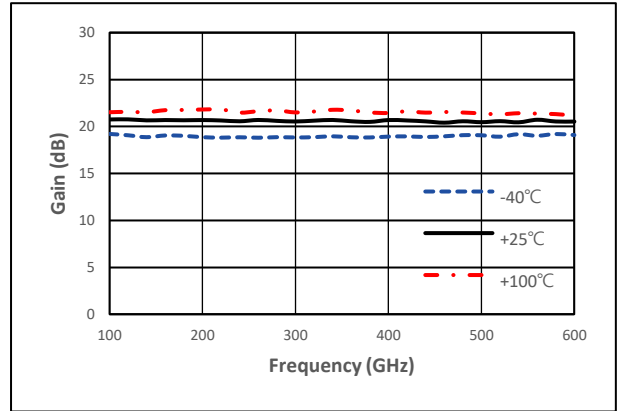
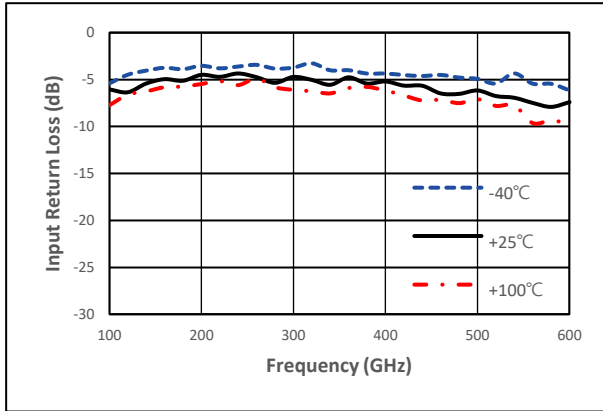
Note:

- 1) R6/R7 ratio sets the current draw. Can be changed for the desired bias point.
- 2) The current may vary under the same conditions according to Vth.
- 3) Gain can be changed by adjusting the feedback resistance and capacitance (R4 and C6).

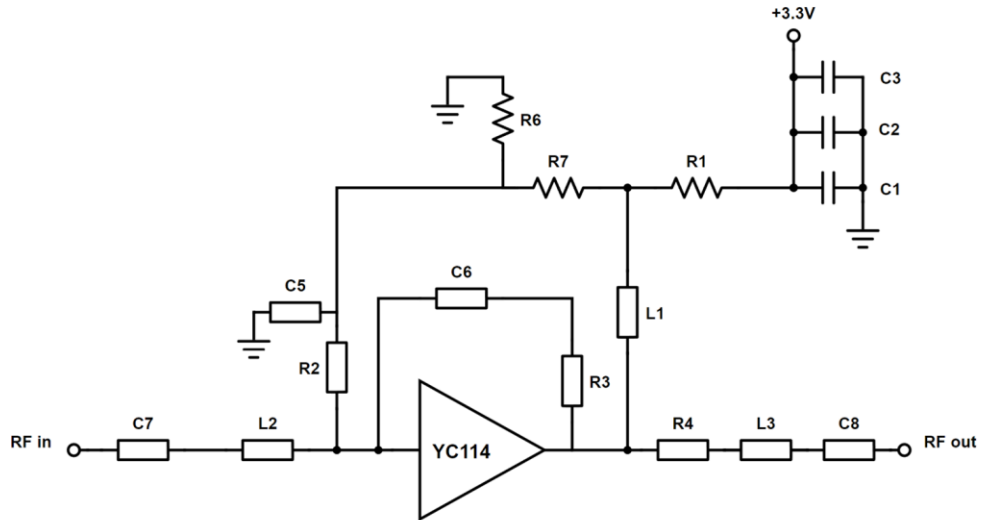
Typical RF Performance (136~527MHz)

Parameter	Unit	Typical RF Performance (@25°C)					
Frequency	MHz	136	350	527	136	350	527
I _{DD}	mA	11	11	11	24	24	24
Gain	dB	21.6	21.5	21.2	23.2	23.2	22.7
Input Return Loss	dB	-6.3	-6.4	-8.9	-7.4	-7.6	-10.4
NF	dB	0.9	1.0	1.0	0.9	1.0	0.9
P1dB	dB	17.1	18.2	18.1	13.9	16.0	14.9
OIP3 (@0dBm/tone)	dBm	23.9	20.0	19.4	26.1	25.3	25.2
OIP3 (@5dBm/tone)	dBm	26.5	23.1	23.0	26.2	24.9	24.7

Performance Plots (136~527MHz)



Application Circuit (1100~1700MHz)



Code	C1	C2	C3	C5	C6	C7	C8	L1	L2	L3	R1	R2	R3	R4	R6	R7
Value	100	1	10	10	100	100	100	27	100	100	0	8.2	820	100	680	4.3
Unit	pF	nF	uF	uF	pF	pF	pF	nH	pF	pF	Ω	nH	Ω	pF	Ω	kΩ

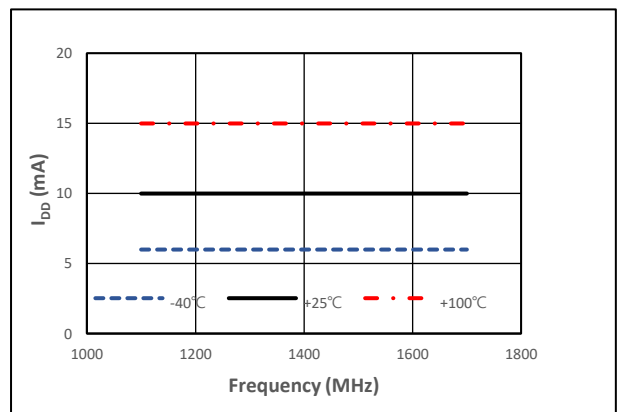
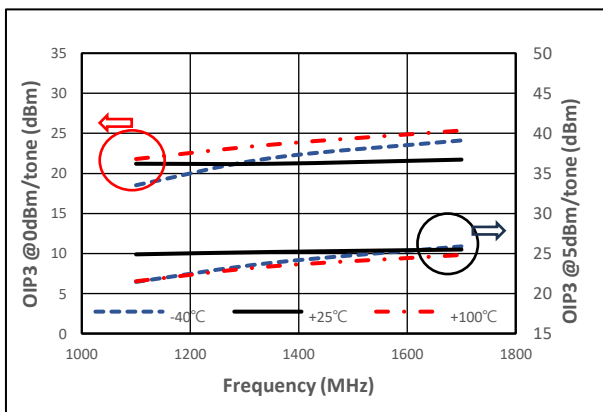
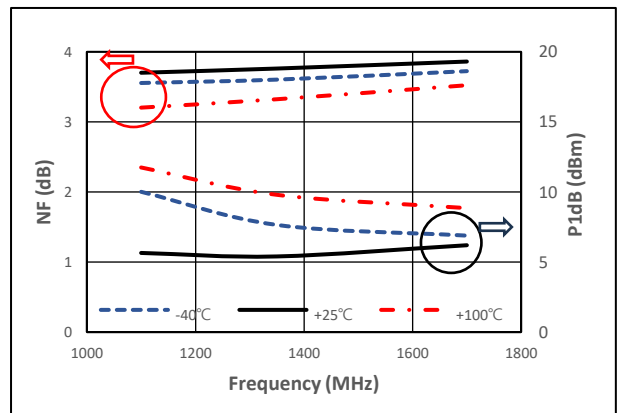
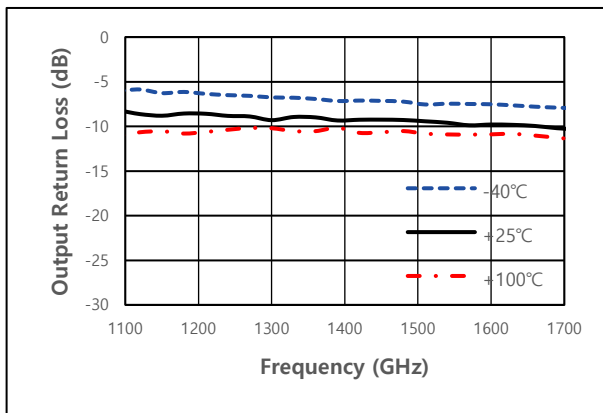
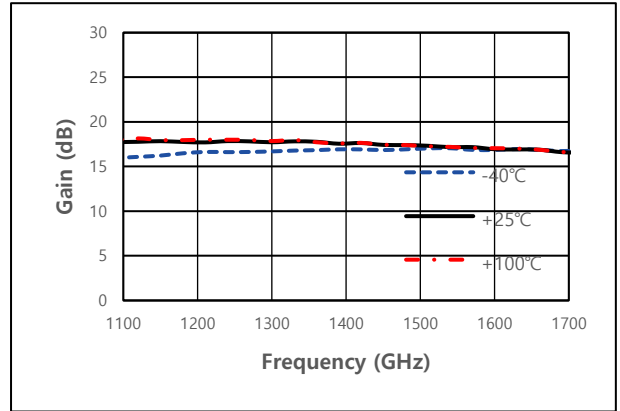
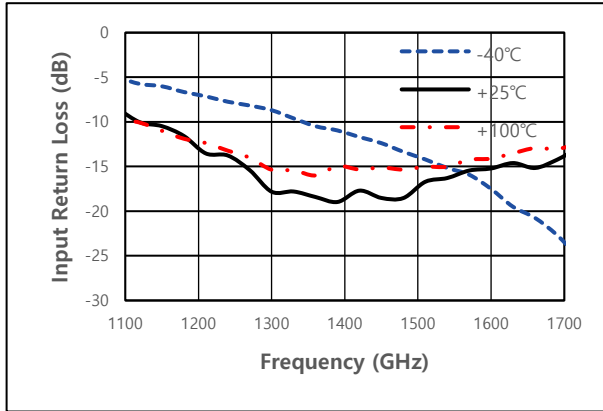
Note:

- 1) R6/R7 ratio sets the current draw. Can be changed for the desired bias point.
- 2) The current may vary under the same conditions according to Vth.
- 3) Gain can be changed by adjusting the feedback resistance and capacitance (R4 and C6).

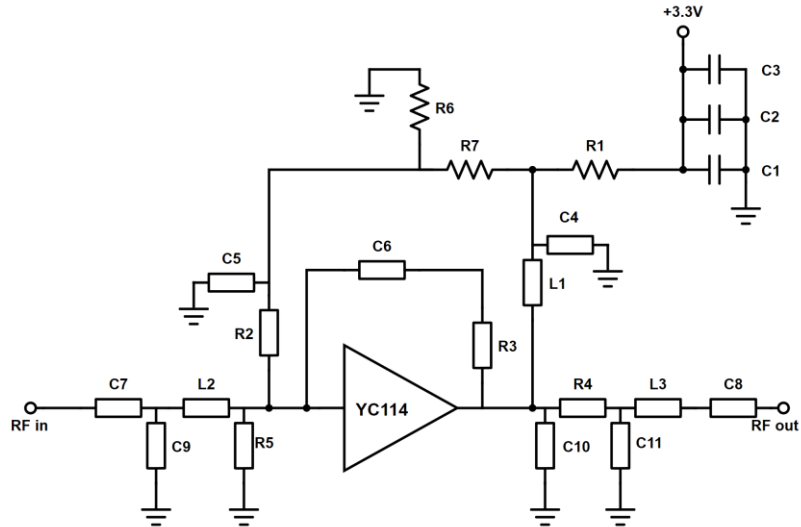
Typical RF Performance (1100~1700MHz)

Parameter	Unit	Typical RF Performance (@25°C)					
Frequency	MHz	1100	1350	1700	1100	1350	1700
I _{DD}	mA	10	10	10	25	25	25
Gain	dB	17.8	17.1	16.1	19.3	18.5	17.3
Input Return Loss	dB	-16.6	-16.3	-13.3	-30.7	-21.1	-15.4
NF	dB	1.1	1.0	1.2	1.2	1.0	1.1
P1dB	dB	18.5	18.8	19.3	18.0	18.2	18.9
OIP3 (@0dBm/tone)	dBm	21.2	21.2	21.7	26.5	26.4	27.6
OIP3 (@5dBm/tone)	dBm	24.9	25.2	25.5	25.7	25.52	26.6

Performance Plots (1100~1700MHz)



Application Circuit (3200~4200MHz)



Code	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	L1	L2	L3	R1	R2	R3	R4	R5	R6	R7
Value	100	1	10	10	1	1	3.9	0	0.5	-	0.5	8.2	0	22	0	5.1	1.8	0	0.5	680	5.1
Unit	pF	nF	uF	pF	nF	nF	pF	Ω	pF	NC	pF	nH	Ω	pF	Ω	nH	kΩ	Ω	pF	Ω	kΩ

Note:

- 1) R6/R7 ratio sets the current draw. Can be changed for the desired bias point.
- 2) The current may vary under the same conditions according to Vth.
- 3) Gain can be changed by adjusting the feedback resistance and capacitance (R4 and C6).

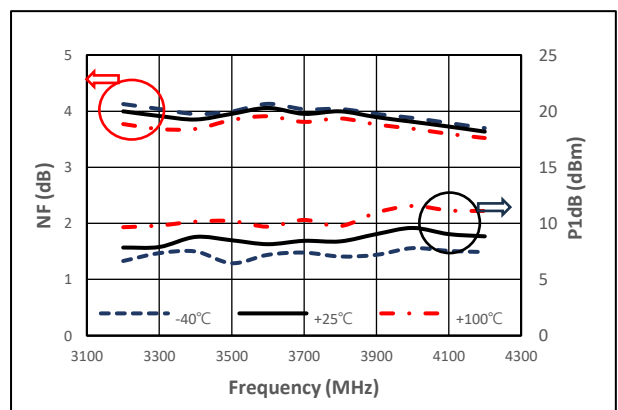
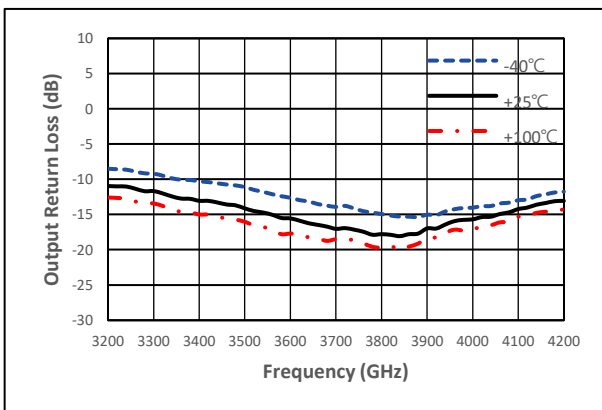
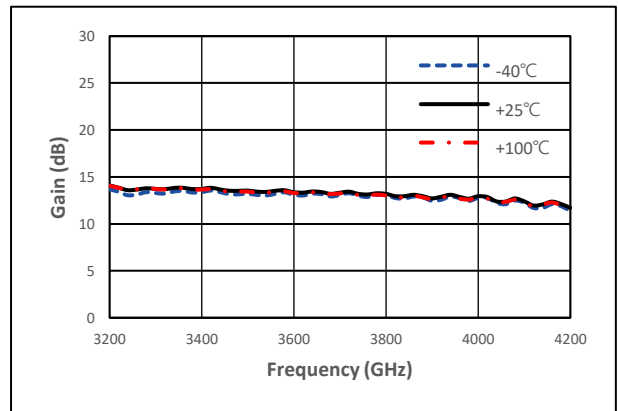
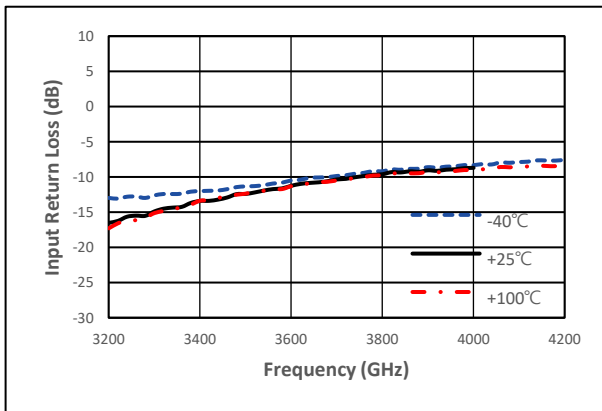
Typical RF Performance (3200~4200MHz)

Parameter	Unit	Typical RF Performance (@25°C)											
Frequency	MHz	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	
I _{DD}	mA	11	11	11	11	11	11	11	11	11	11	11	
Gain	dB	14.1	13.7	13.7	13.5	13.8	13.3	13.2	12.7	12.9	12.4	11.7	
Input Return Loss	dB	-16.4	-15.2	-13.8	-12.5	-11.3	-10.3	-9.6	-8.8	-8.4	-8.1	-7.8	
NF	dB	1.0	1.0	1.1	1.1	1.0	1.0	1.1	1.2	1.1	1.1	1.0	
P1dB	dB	19.4	19.4	19	19.1	20.1	19.1	19.4	18.4	17.9	17.8	17.4	
OIP3 (@0dBm/tone)	dBm	22.3	21.6	22.1	22.9	22.1	23.0	23.1	23.3	24.9	25.0	24.6	
OIP3 (@5dBm/tone)	dBm	24.4	23.8	23.4	24.0	24.1	24.1	23.8	24.4	25.7	25.4	25.6	

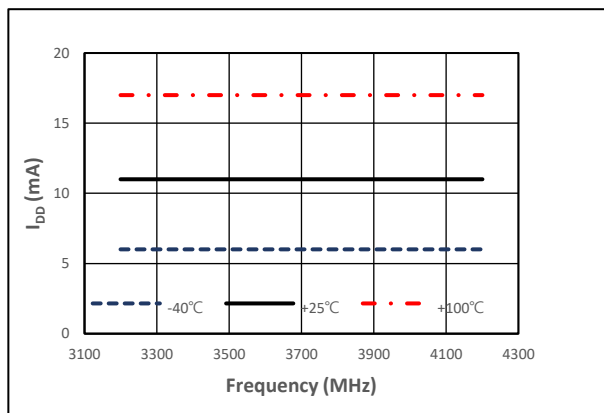
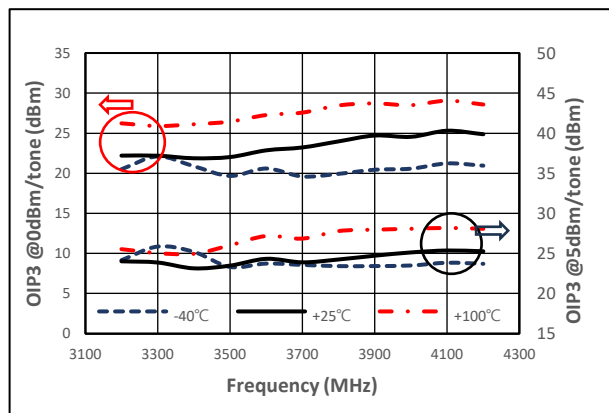
Typical RF Performance (3200~4200MHz)

Parameter	Unit	Typical RF Performance (@25°C)										
Frequency	MHz	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200
I _{DD}	mA	25	25	25	25	25	25	25	25	25	25	25
Gain	dB	14.8	14.5	14.4	14.2	14.0	13.9	13.8	13.4	13.5	12.9	12.4
Input Return Loss	dB	-19.5	-17.0	-14.8	-13.3	-11.9	-10.9	-10.2	-9.2	-8.6	-8.1	-7.6
NF	dB	0.9	0.9	1.0	1.1	1.1	0.9	0.9	0.9	1.0	1.0	1.0
P1dB	dB	19.2	19.2	18.7	19.1	19.8	19.0	18.8	18.3	17.9	17.8	17.2
OIP3 (@0dBm/tone)	dBm	30.0	29.7	30.2	30.6	29.7	30.5	31.3	31.1	31.6	31.7	31.5
OIP3 (@5dBm/tone)	dBm	29.5	29.1	29.5	30.7	30.0	30.7	30.7	31.1	32.2	31.7	31.5

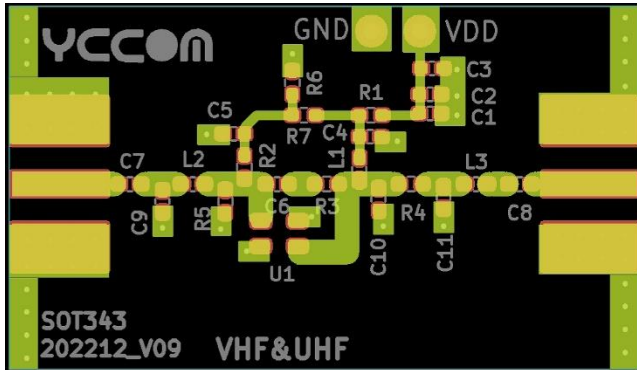
Performance Plots (3200~4200MHz)



Performance Plots (3200~4200MHz, continued)



Evaluation Board PCB Information

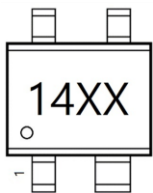


Note:

- 1) Transmission Line Width : 1.28 mm
- 2) PCB Thickness : 0.98 mm

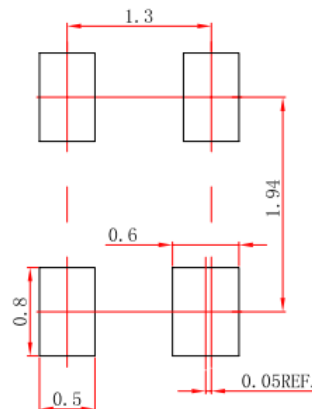
Layer	Material	Thickness
Top Layer1	Copper	0.035mm
Core	Core	FR4
Inner Layer2	Copper	0.0175mm
Prepreg	Prepreg	FR4
Inner Layer3	Copper	0.0175mm
Core	Core	FR4
Bottom Layer4	Copper	0.0175mm

Package Marking



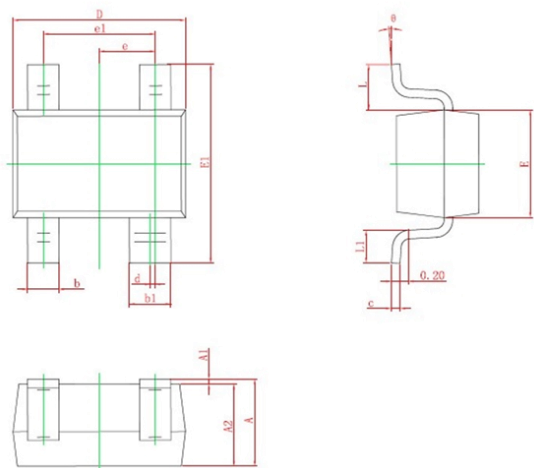
P/N : YC114
XX : Wafer No.

PCB Land Pattern



Unit : mm

Package Outline Drawing



Symbol	Min.	Max.
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.250	0.400
b1	0.350	0.500
c	0.080	0.150
d	0.050	
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 TYP.	
e1	1.200	1.400
L	0.525 REF.	
L1	0.260	0.460
θ	0°	8°

Unit : mm