ASL19C

5 ~ 3000 MHz High Linearity LNA MMIC

Features

- 13.0 dB Gain at 2000 MHz
- 21.5 dBm P1dB at 2000 MHz
- 37.5 dBm Output IP3 at 2000 MHz
- 0.9 dB NF at 2000 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASL19C, a wideband linear low noise amplifier MMIC, has a low noise and high linearity at low bias current, being suitable for use in both receiver and transmitter of telecommunication systems up to 3 GHz. S11 down to –18 dB is easily achieved for low noise application to provide a good productivity. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant

Package Style: SOT89

Typical Performance

(Supply Voltage = +5.0 V, T_A = +25 °C, Z_0 = 50 Ω)

Parameters	Units	Typical	
Frequency	MHz	850	2000
Gain	dB	19.5	13.0
S11	dB	-18	-18
S22	dB	-13	-14
Output IP3[1)]	dBm	35.5	37.5
Noise Figure	dB	0.8	0.9
Output P1dB	dBm	21.0	21.5
Current	mA	68	68
Device Voltage	V	+4.0	+4.0

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

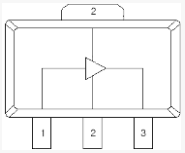
Application Circuit

- IF
- CDMA
- GPS
- WCDMA
- TIA (75 ohm)
- 0.3~4 MHz

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		2000	
Gain	dB		13.0	
S11	dB		-18	
S22	dB		-16	
Output IP3	dBm		37.5	
Noise Figure	dB		0.9	
Output P1dB	dBm		21.5	
Current	mA		68	
Device Voltage	V		+4.0	

Pin Configuration



Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

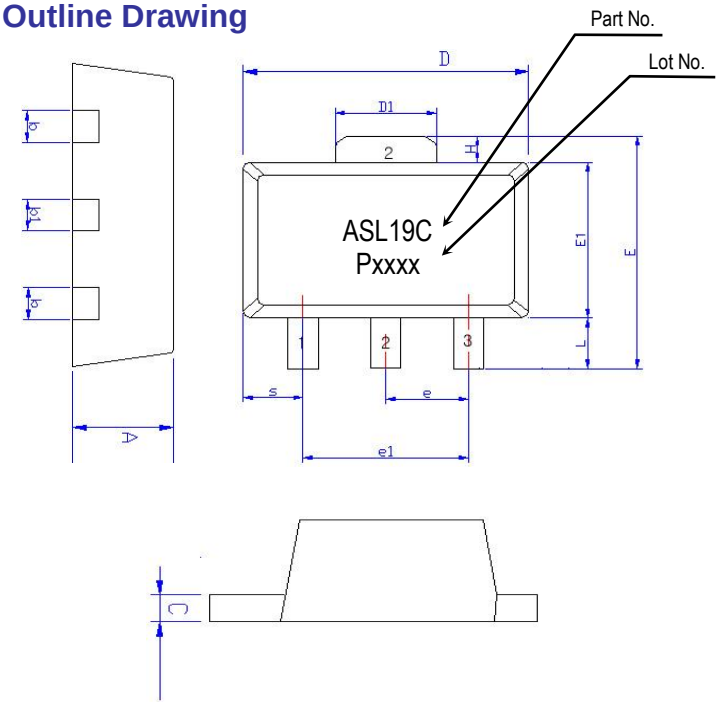
Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+5.5 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched as in 2000 MHz application circuit)*	+22 dBm
Thermal Resistance	80 °C/W

The operation of this device in excess of any of these limits may cause permanent damage.

* Refer to the max. input power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input power, in principle, depends upon the application frequency, the matching circuit, and device voltage

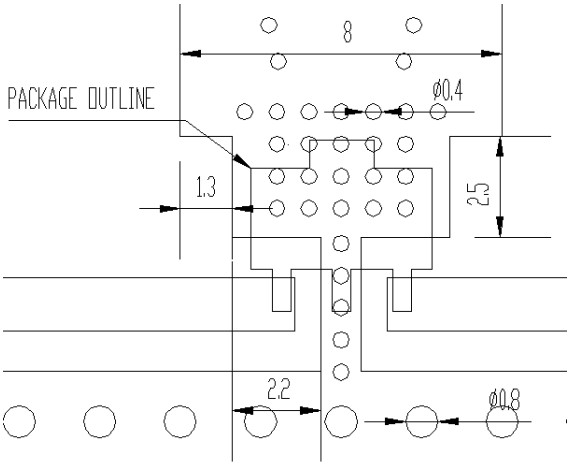
Outline Drawing



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
L	0.89	1.04	1.20
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
C	0.38	0.40	0.43
D	4.40	4.50	4.60
D1	1.40	1.60	1.75
E	3.64	---	4.25
E1	2.40	2.50	2.60
e1	2.90	3.00	3.10
H	0.35	0.40	0.45
S	0.65	0.75	0.85
e	1.40	1.50	1.60

Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

Mounting Recommendation (In mm)



Note: 1. The number and size of ground via holes in a circuit board is critical for thermal and RF grounding considerations.
2. We recommend that the ground via holes be placed on the bottom of the lead pin 2 and exposed pad of the device for better RF and thermal performance, as shown in the drawing at the left side.

ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	Class 1A
MM	Class A

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

APPLICATION CIRCUIT

IF

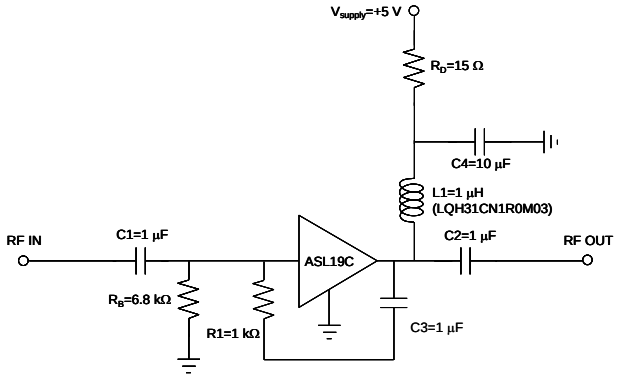
30 ~ 512 MHz

+5 V

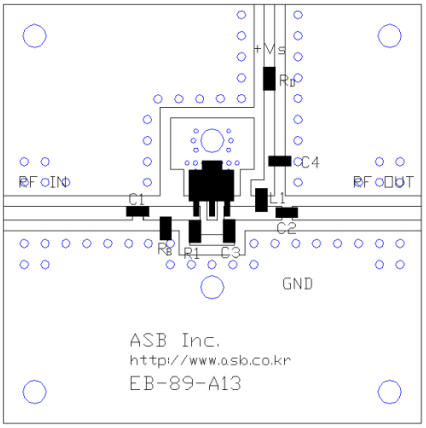
Frequency (MHz)	30	150	300	512
Magnitude S21 (dB)	24.5	24.0	23.0	21.8
Magnitude S11 (dB)	-15	-13	-10	-10
Magnitude S22 (dB)	-9	-10	-11	-15
Output P1dB (dBm)	21	21	21	20
Output IP3[1)] (dBm)	30.5	33.5	35.0	35.0
Noise Figure (dB)	0.9	0.8	0.7	0.65
Device Voltage (V)	+4.0	+4.0	+4.0	+4.0
Current (mA)	68	68	68	68

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

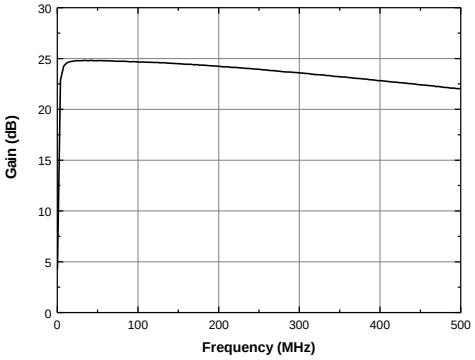
Schematic

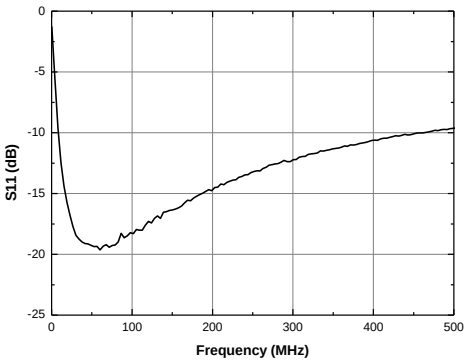


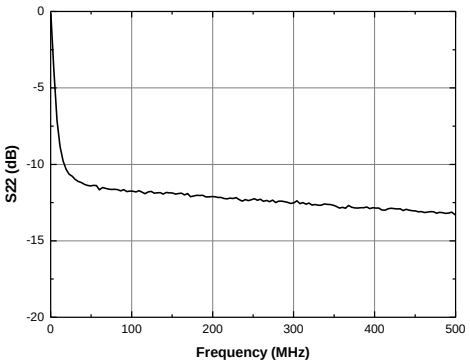
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters







APPLICATION CIRCUIT

CDMA

824 ~ 894 MHz

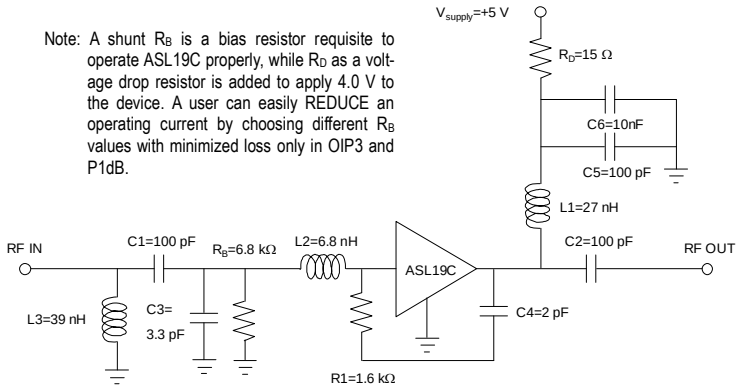
+5 V

Frequency (MHz)	824	894
Magnitude S21 (dB)	19.9	19.2
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-15	-12
Output P1dB (dBm)	20.5	21.0
Output IP3[1)] (dBm)	35.5	35.5
Noise Figure (dB)	0.8	0.8
Device Voltage (V)	+4.0	+4.0
Current (mA)	68	68

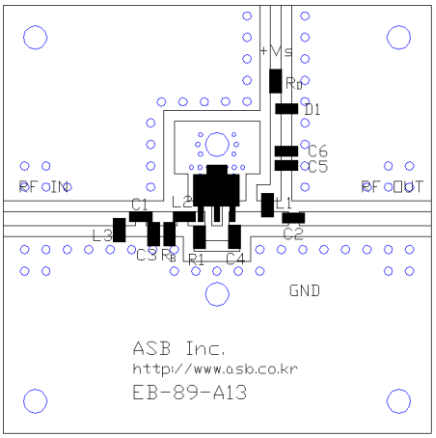
1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

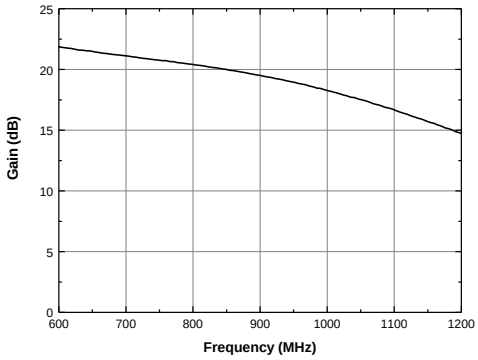
Note: A shunt R_B is a bias resistor requisite to operate ASL19C properly, while R_D as a voltage drop resistor is added to apply 4.0 V to the device. A user can easily REDUCE an operating current by choosing different R_B values with minimized loss only in OIP3 and P1dB.

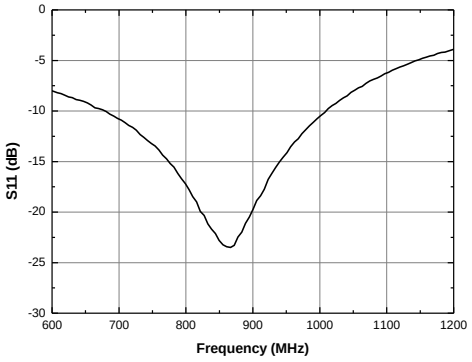


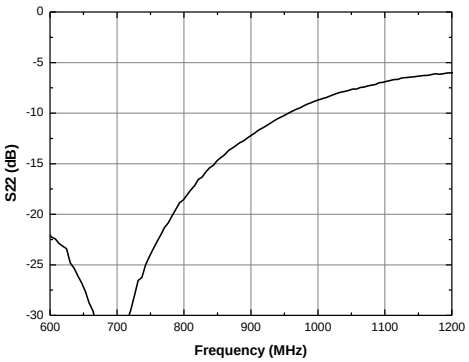
Board Layout (FR4, 40x40 mm², 0.8T)

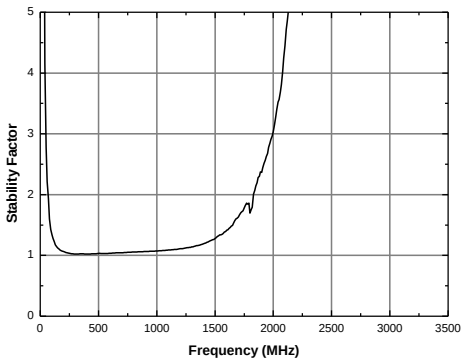


S-parameters & K-factor









APPLICATION CIRCUIT

GPS

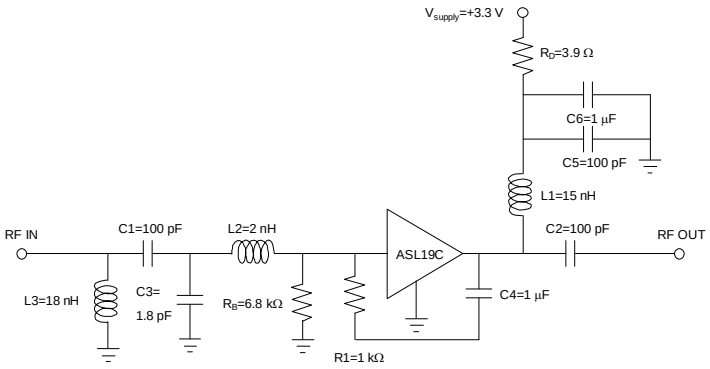
1575 MHz

+3.3 V

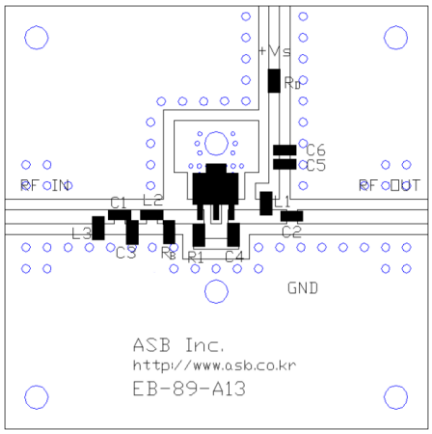
Frequency (MHz)	1575
Magnitude S21 (dB)	14.5
Magnitude S11 (dB)	-15.0
Magnitude S22 (dB)	-11.0
Output P1dB (dBm)	20.0
Output IP3[1)] (dBm)	28.5
Noise Figure (dB)	0.9
Device Voltage (V)	3.2
Current (mA)	25

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

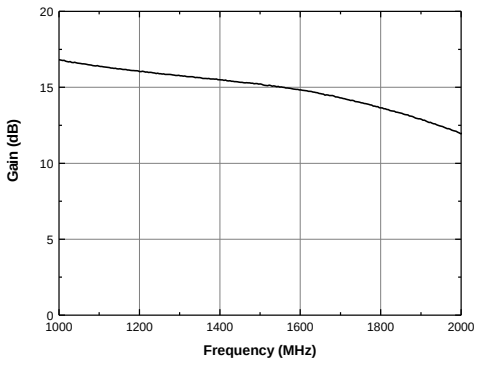
Schematic

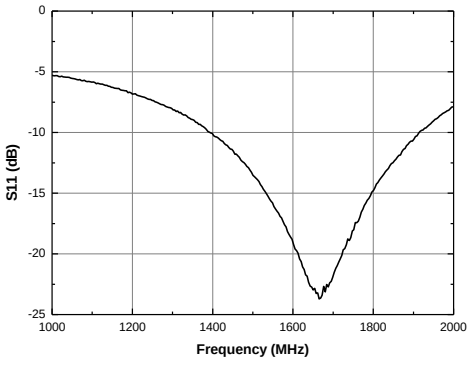


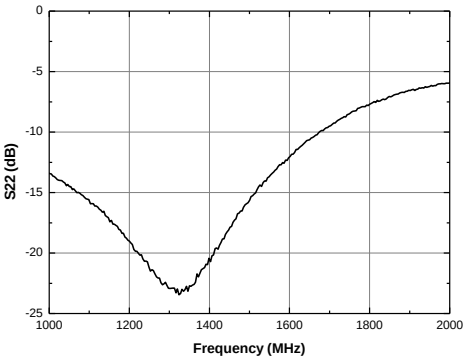
Board Layout (FR4, 40x40 mm², 0.8T)

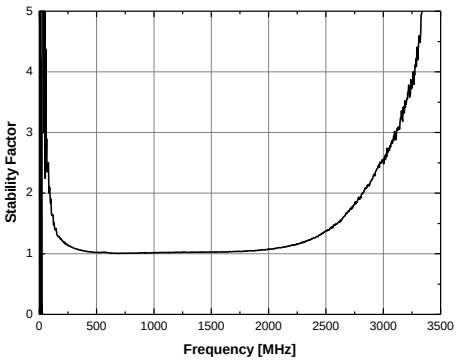


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA

1920 ~ 2170 MHz

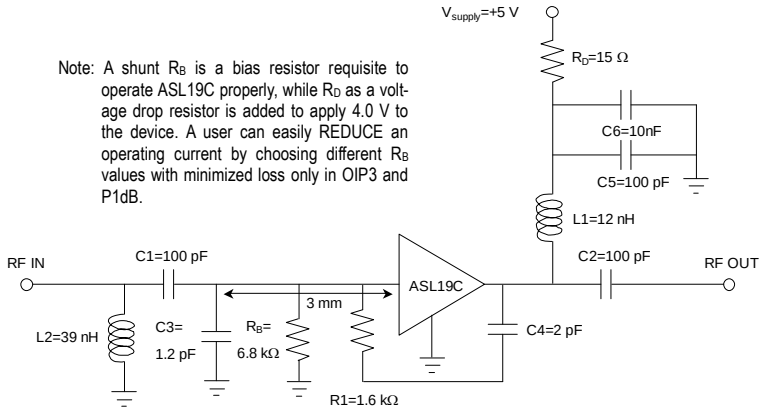
+5 V

Frequency (MHz)	1920	2170
Magnitude S21 (dB)	13.3	12.3
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-16	-12
Output P1dB (dBm)	21.5	21.5
Output IP3[1)] (dBm)	37.5	37.5
Noise Figure (dB)	0.9	0.9
Device Voltage (V)	+4.0	+4.0
Current (mA)	68	68

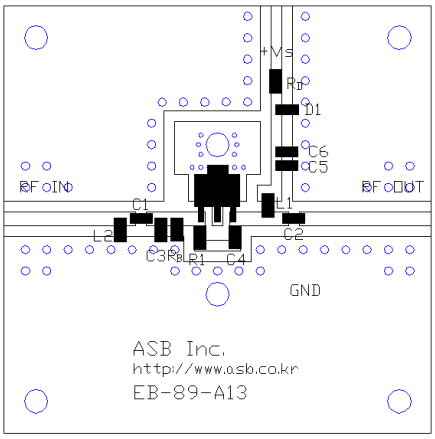
1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

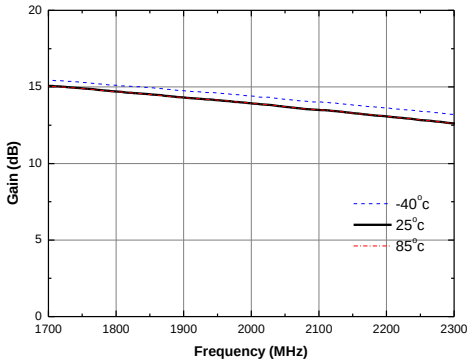
Note: A shunt R_B is a bias resistor requisite to operate ASL19C properly, while R_D as a voltage drop resistor is added to apply 4.0 V to the device. A user can easily REDUCE an operating current by choosing different R_B values with minimized loss only in OIP3 and P1dB.

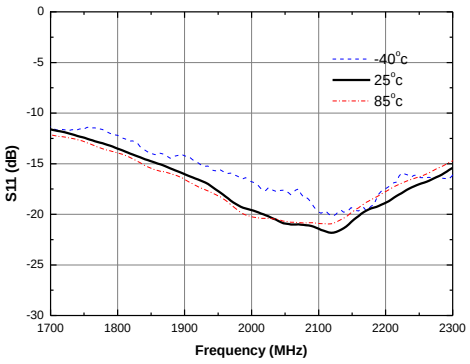


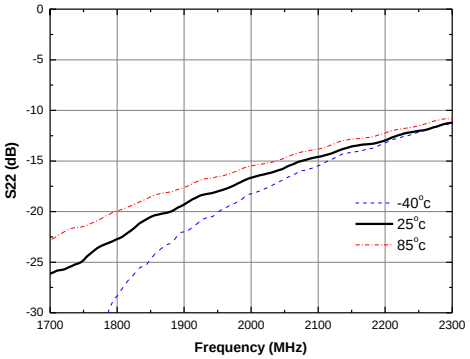
Board Layout (FR4, 40x40 mm², 0.8T)

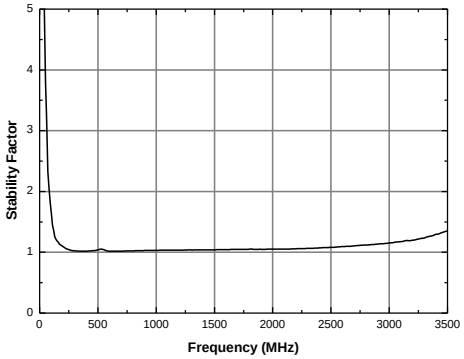


S-parameters & K-factor

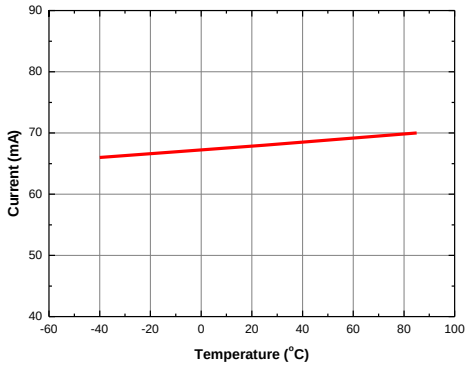




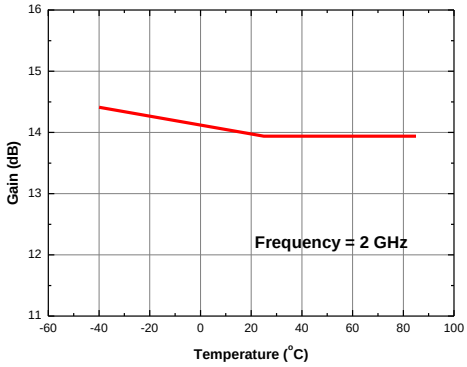




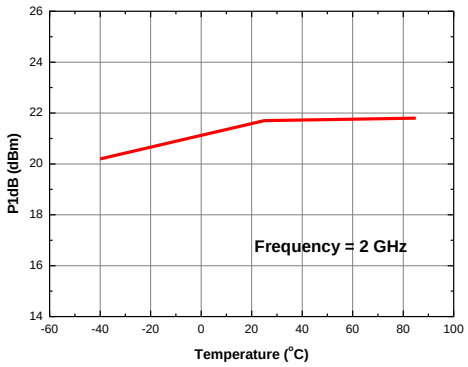
Current vs. Temperature



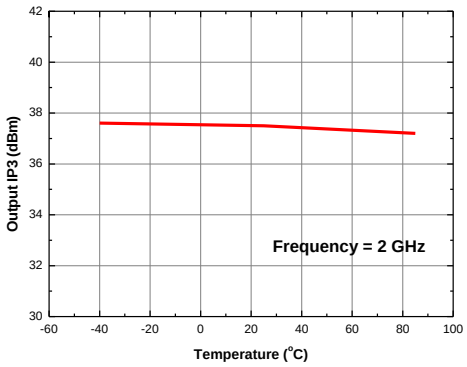
Gain vs. Temperature



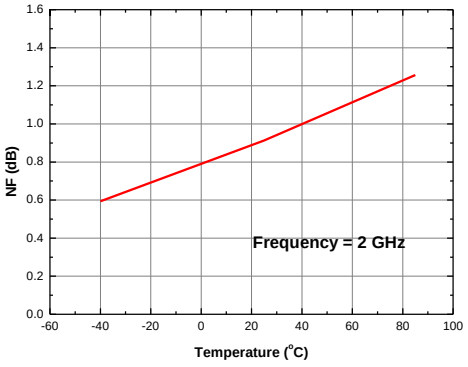
P1dB vs. Temperature



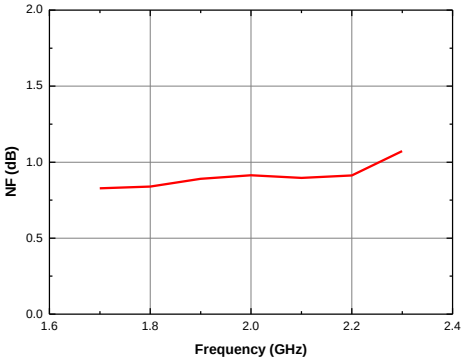
Output IP3 vs. Temperature



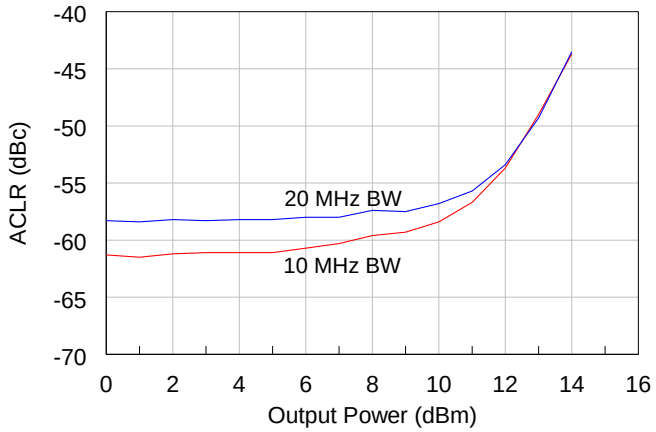
NF vs. Temperature



NF vs. Frequency

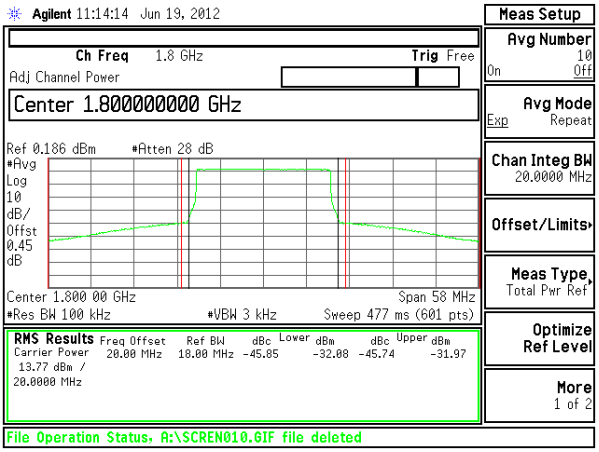


LTE ACLR – 10 MHz & 20 MHz



1) Test Source : LTE_FDD_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 1.8 GHz

LTE ACLR – 20 MHz



2) Test Source : LTE_FDD_test model 3.1, BW: 20 MHz, Test Frequency: 1.8 GHz

APPLICATION CIRCUIT

Trans-impedance Amplifier

75 ohm

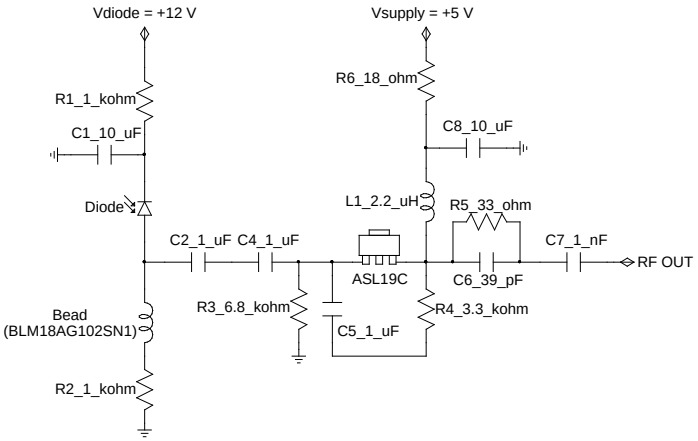
5 ~ 200 MHz

+5 V

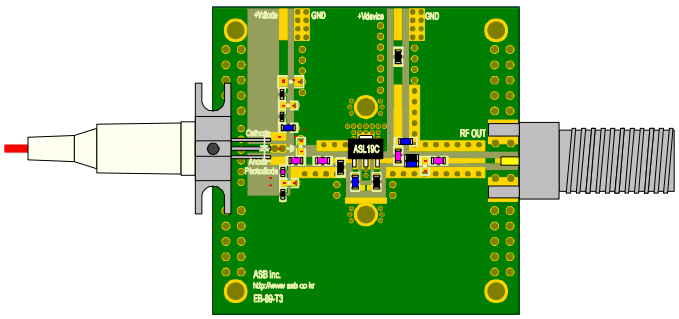
Frequency (MHz)	5	50	200
Magnitude S21 (dB)	28.9	28.3	23.7
Magnitude S22 (dB)	-8.5	-10.0	-9.0
EIN (pA/√Hz)	4.2	4.3	4.3
Output IP3[1)] (dBm)	24.3	25.5	26.7
Device Voltage (V)	+4.0	+4.0	+4.0
Current (mA)	54	54	54

1) OIP3 is measured with two tones at an output power of -3 dBm/tone separated by 6 MHz.

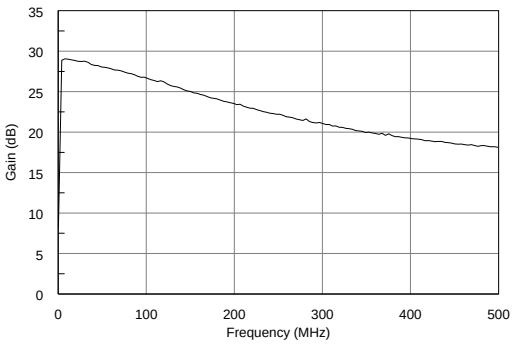
Schematic

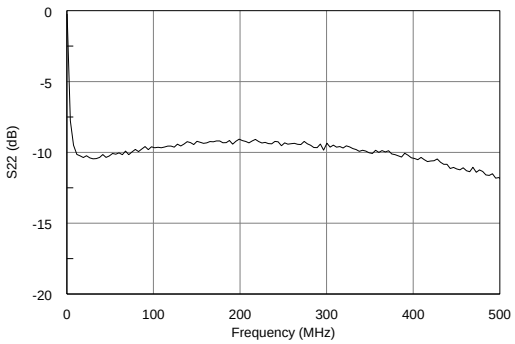


Board Layout (FR4, 40x40 mm^2, 0.8T)



S-parameters





APPLICATION CIRCUIT

0.3 ~ 4 MHz

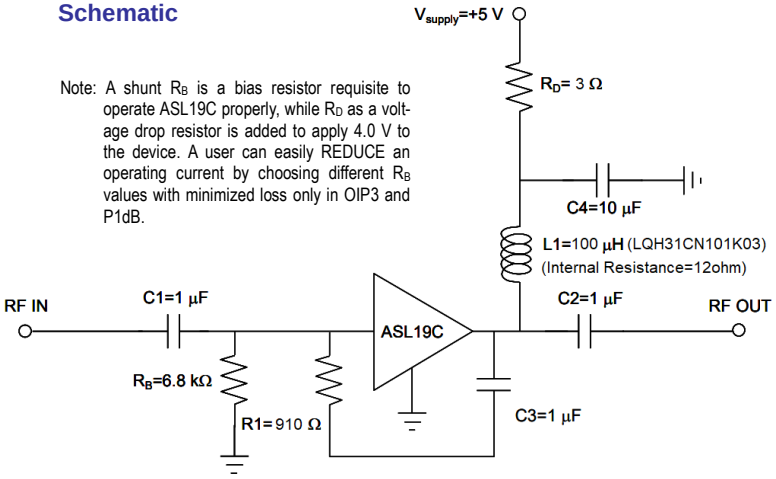
+5 V

Frequency (MHz)	0.3	4
Magnitude S21 (dB)	23.8	23.9
Magnitude S11 (dB)	-20.0	-20.0-
Magnitude S22 (dB)	-10.0	-11.0
Output P1dB (dBm)	20.0	20.0
Output IP3[1)] (dBm)	25.0	27.0
Noise Figure (dB)	-	2.05
Device Voltage (V)	3.8	3.8
Current (mA)	54	54

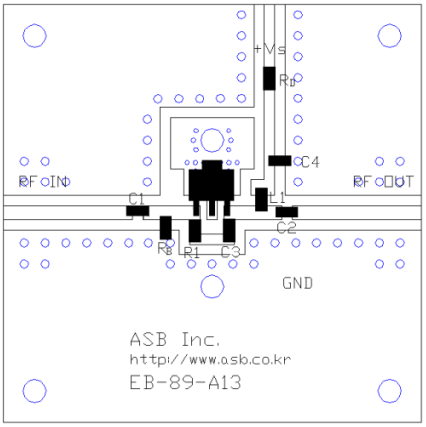
1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

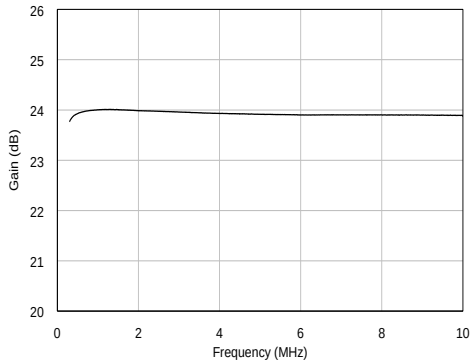
Note: A shunt R_B is a bias resistor requisite to operate ASL19C properly, while R_D as a voltage drop resistor is added to apply 4.0 V to the device. A user can easily REDUCE an operating current by choosing different R_B values with minimized loss only in OIP3 and P1dB.

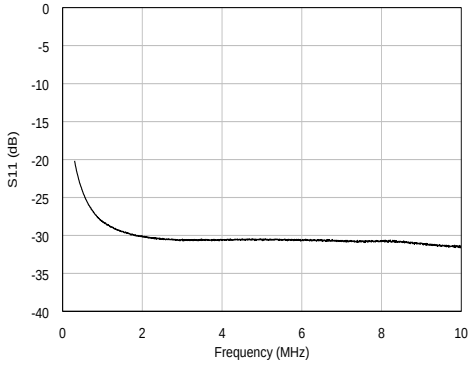


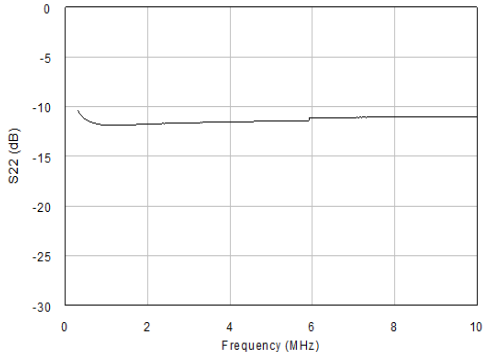
Board Layout (FR4, 40x40 mm², 0.8T)

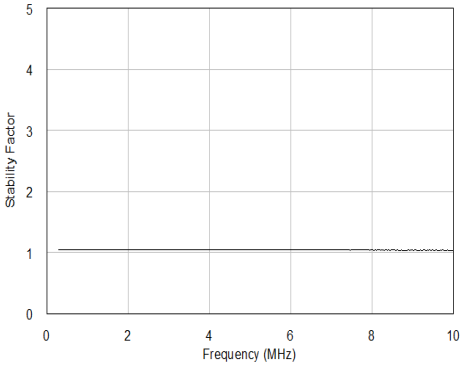


S-parameters & K-factor









Recommended Soldering Reflow Profile