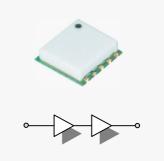


#### **Features**

- · 27 dB Gain at 2045 MHz
- · +20 dBm P1dB
- +38 dBm Output IP3
- · 0.9 dB Noise Figure
- · 5 dBm WCDMA(4FA)
- · Operating at Single 5V Supply
- · 80 mA Current Consumption
- . +5 dBm Max. Input RF Power

The plerow<sup>™</sup> ALN-series LNA is compact-sized RF mini-modules that are widely applicable as low noise amplifier and general purpose gain block for use in mobile infrastructure equipments such as cellular, GSM, PCS, IMT-2000 and so on. This mini-modules are available in surface-mount package and provide exceptionally low noise with outstanding gain and linearity performance. The LNA designed with low current consumption less than 1 watt also makes telecommunication systems more reliable.





2-stage Single Type

More Information

Website: www.asb.co.kr E-mail: sales@asb.co.kr Tel: (82) 42-528-7220 Fax: (82) 42-528-7222

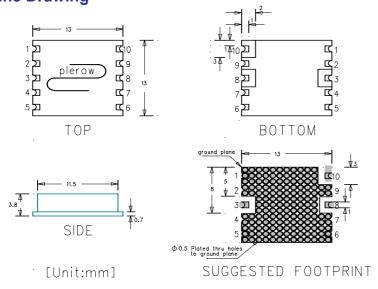
ASB Inc., 4th FI. Venture Town Bldg., 367-17 Goijeong-Dong, Seo-Gu, Daejon 302-716, Korea

#### **Specifications**

| Parameter                          | Unit | Specification                 |
|------------------------------------|------|-------------------------------|
| Frequency Range                    | MHz  | 1920 ~ 2170                   |
| Gain                               | dB   | 27                            |
| Gain Flatness                      | dB   | ± 0.5                         |
| Noise Figure                       | dB   | 0.9                           |
| Output IP3 (min)                   | dBm  | 38                            |
| ACLR @5 dBm Pout and<br>4 FA WCDMA | dBc  | - 45 @±5 MHz<br>- 50 @±10 MHz |
| VSWR                               | -    | 1.5                           |
| Output P1dB                        | dBm  | 20                            |
| Supply Current                     | mA   | 80                            |
| Supply Voltage                     | V    | 5                             |
| Impedance                          | Ω    | 50                            |
| Max. RF Input Power                | dBm  | +5                            |
| Package Type & Size                | mm   | SMT, 13Wx13Lx3.8H             |

1) Measurement conditions are as follows: T = 25°C,  $V_{CC}$  = 5 V, Freq. = 2045 MHz, 50 ohm system. 2) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz. 3) Note: We recommend that the VSWR toward a source and load be less than 1:4 to avoid an unwanted oscillation.

# **Outline Drawing**



| Pin Number | Function |
|------------|----------|
| 3          | RF In    |
| 8          | RF Out   |
| 10         | +Vcc     |
| Others     | Ground   |

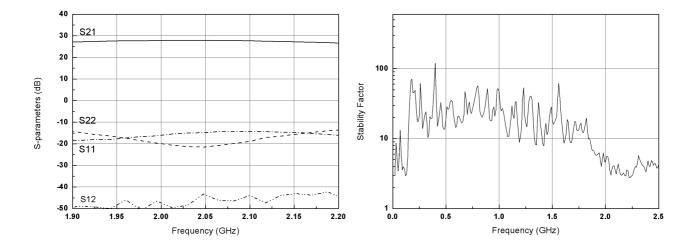
Note: 1. The number and size of ground via holes in a circuit board is critical for thermal RF grounding considerations. 2. We recommend that the ground via holes be

placed on the bottom of all ground pins for better RF and thermal performance, as shown in the drawing at the left side.



## **S**-parameters

**Stability Factor (K)** 



## Noise Figure & Gain Flatness

OIP3

|                 |                 |          | 1kr1<br>1kr2<br>1kr3 | 2.045 | GHz<br>GHz<br>GHz |             | 0.829<br>0.762<br>0.835 | dB               | 28            | .567 dB<br>.208 dB<br>.343 dB |  |
|-----------------|-----------------|----------|----------------------|-------|-------------------|-------------|-------------------------|------------------|---------------|-------------------------------|--|
| 9.000<br>40.00  |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
| 40.00           |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
| NFIG            |                 | 1<br>0 × |                      |       |                   | 2<br>•      |                         |                  | )<br>O        |                               |  |
| Scale/<br>1.000 |                 |          |                      |       |                   |             |                         |                  | <b>v</b>      |                               |  |
| dB              |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
|                 |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
|                 |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
| GAIN<br>Scale/  |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
| 5.000<br>dB     |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
| uD              |                 | 1<br>Q   | <u> </u>             |       |                   | 2           |                         |                  | 3             |                               |  |
| -1.000          |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
| -10.00          |                 |          |                      |       |                   |             |                         |                  |               |                               |  |
|                 | art 1.88000 GHz |          | BW 4                 |       |                   | oints 1     |                         | Stop 2.21000 GHz |               |                               |  |
| Tcold 3         | Tcold 306.62 K  |          |                      | 5     | F                 | Att 0/–– dB |                         |                  | Loss Off Corr |                               |  |

| Interm                                          | <b>Ch</b><br>od (T0     | I Freq<br>I)             | 2.04                  |         |                   |    | Tri: | g Free          |                |                  |
|-------------------------------------------------|-------------------------|--------------------------|-----------------------|---------|-------------------|----|------|-----------------|----------------|------------------|
|                                                 | .7 dBm                  |                          | Atten                 | 50 dB   |                   |    |      | Mkr1 (          |                | 100 GH<br>16 dBm |
| #Samp<br>Log<br>10<br>dB/<br>0ffst<br>0.7<br>dB | vik./****¶V             | Harris and Andrew Harris | <b>, 116-11-116-1</b> |         |                   |    |      | а, фрона ралону |                |                  |
|                                                 | 2.044<br>W 30 k         | <br>500 GH<br>Hz         | lz                    | +\      | l<br>VBW 3 k      | Hz |      | Sw              | Span<br>eep 11 | 4 MH:<br>0.4 ms  |
| TOI                                             | (Wors<br>lower<br>upper |                          |                       | 2.043 G | GHz<br>iHz<br>iHz |    | dBm  |                 |                |                  |

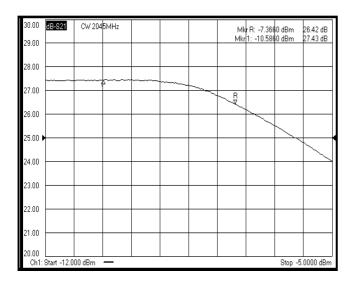


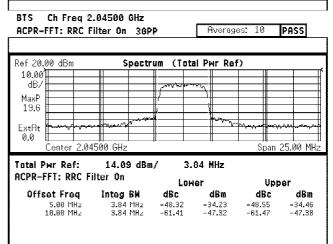
Low Noise Amplifier

P1dB

(SK Telecom)

#### ACLR @14 dBm Pout for 1 FA WCDMA





# ACLR @5 dBm $P_{\mbox{out}}$ for 4 FA WCDMA

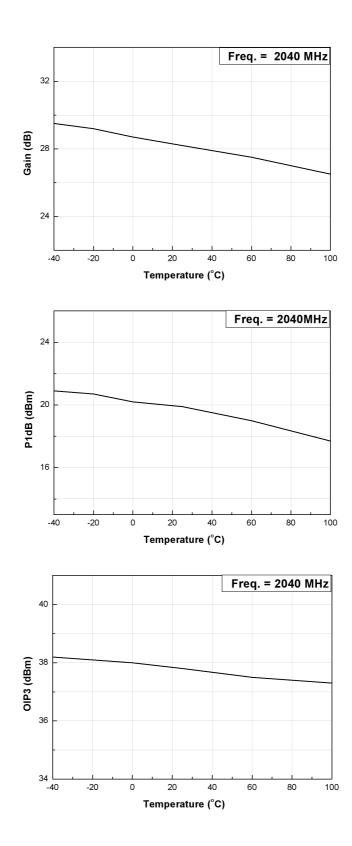
## ACLR @5 dBm P<sub>OUT</sub> for 4 FA WCDMA (KT ICOM)

#### ▲ Mkr4 10.00 MHz #Atten 20 dB Ref -13 dBm -52.23 dB Norm r fight , ŵ Log 10 dB/ 4 LgAv Span 50 MHz Center 2.140 00 GHz ₩Res BW 30 kHz \*VBW 300 Hz Sweep 4.332 s Marker 1R Trace (1) (1) (1) (1) (1) (1) (1) (1) (1) X Axis 2.132 50 GHz -10.00 MHz 2.132 50 GHz Amplitude -22.59 dBm -50.90 dB -23.03 dBm Type Freq Freq Freq 1۵ 2R 24 38 34 48 Freq Freq Freq Freq -5.00 MHz 2.147 50 GHz 5.00 MHz 2.147 50 GHz -47.70 dB -23.21 dBm -48.61 dB -22.64 dBm 40 (1)Freq 10.00 MHz -52.23 dB

| lef -13<br>Iorm 🔽 | dBm    |                    | ∎Atten i<br>I |         | 1            |                   | 4 R      | 1            | -51              | .25 dE          |
|-------------------|--------|--------------------|---------------|---------|--------------|-------------------|----------|--------------|------------------|-----------------|
| og  <br>Ø         |        |                    |               | /mggent | proposetting | /******           | 1 martin |              |                  |                 |
| ₿∕                |        |                    |               | []      |              |                   |          |              |                  |                 |
|                   |        | 1                  | _2            |         |              |                   |          | 3            |                  |                 |
|                   | N/#N98 | <del>wanikan</del> | gun fante     |         | <b> </b>     |                   |          | <b>WIGAN</b> | 4<br>11          | HINNIN MARK     |
|                   |        |                    |               |         |              |                   |          |              |                  |                 |
| gAv ⊨             |        |                    |               |         |              |                   |          |              |                  |                 |
| enter 2           | .160   | 00 GHz             | :             |         | L            |                   | 1        | 1            | Span             | 50 MH:          |
| Res BW            | 30 kl  | Ηz                 |               | *V      | BW 300       | Hz                |          |              | Sweep 4          | <b>1.</b> 332 : |
| Marker<br>1R      |        | race<br>(1)        | Type<br>Freq  |         | 2.152        | Axis<br>50 GHz    |          |              | Amplit<br>-22.71 | dBm             |
| 1∆<br>2R          | ;      | (1)<br>(1)         | Freq<br>Freq  |         | 2.152        | .00 MHz<br>50 GHz |          |              | -50.24<br>-22.57 | dBm             |
| 24<br>38          |        | (1)                | Freq<br>Freq  |         | 2.167        | .00 MHz<br>50 GHz |          |              | -48.24<br>-23.23 | dBa             |
| 34<br>4R          |        | (1)<br>(1)         | Freq<br>Freq  |         | 2.167        | .00 MHz<br>50 GHz |          |              | -49.48<br>-23.48 | dBm             |
| 40                | 1      | (1)                | Freq          |         | 10.          | .00 MHz           |          |              | -51.25           | 5 dB            |



## Gain, P1dB, and OIP3 with Temperature (-40°C $\sim$ 100°C)



# **Plerow ALN2040**

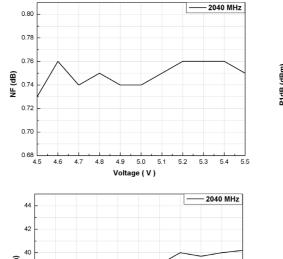


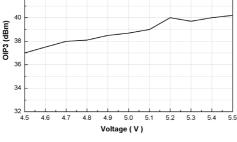
Low Noise Amplifier

## NF, P1dB, OIP3, and S-parameters with Voltage Change (4.5 V ~ 5.5 V)

|           | Voltage  | Current |         | S21 (dB) |         |         | S11(dB) |         |         | S22 (dB) | P1dB    | OIP3  | NF    |      |
|-----------|----------|---------|---------|----------|---------|---------|---------|---------|---------|----------|---------|-------|-------|------|
|           | (V) (mA) | (mA)    | 1920MHz | 2040MHz  | 2170MHz | 1920MHz | 2040MHz | 2170MHz | 1920MHz | 2040MHz  | 2170MHz | (dBm) | (dBm) | (dB) |
|           | 4,5      | 71      | 27      | 27,5     | 26,8    | -18,1   | -13,7   | -14.3   | -15,4   | -20,9    | -16,1   | 18,6  | 37    | 0,73 |
|           | 4,6      | 72      | 27      | 27,5     | 26,8    | -18,5   | -14     | -14.6   | -15,5   | -21      | -16     | 19,1  | 37,5  | 0,76 |
|           | 4,7      | 74      | 27,1    | 27,6     | 26,9    | -18,8   | -14,1   | -14.7   | -15,3   | -21      | -16,2   | 19,2  | 38    | 0,74 |
|           | 4,8      | 76      | 27,1    | 27,6     | 27      | -19,2   | -14.3   | -14.9   | -15,3   | -21      | -16,2   | 19,4  | 38,1  | 0,75 |
|           | 4,9      | 78      | 27.2    | 27.7     | 27      | -19,7   | -14.4   | -15     | -15,1   | -21,1    | -16.3   | 19,6  | 38,5  | 0,74 |
|           | 5        | 80      | 27,3    | 27.7     | 27      | -20     | -14.6   | -15,2   | -15,1   | -21      | -16.6   | 20    | 38,7  | 0,74 |
|           | 5,1      | 82      | 27.3    | 27,8     | 27.1    | -20,1   | -14.9   | -15,2   | -15,1   | -21      | -16.4   | 20,1  | 39    | 0,75 |
|           | 5,2      | 84      | 27.4    | 27,8     | 27.1    | -20,6   | -15     | -15,4   | -15     | -21.1    | -16.6   | 20,3  | 40    | 0,76 |
|           | 5,3      | 86      | 27.4    | 27,9     | 27.2    | -21     | -15.1   | -15,4   | -15     | -21.1    | -16.6   | 20,5  | 39,7  | 0,76 |
|           | 5,4      | 88      | 27.4    | 27,9     | 27.2    | -21     | -15,3   | -15,6   | -14.8   | -21      | -16,5   | 20,7  | 40    | 0,76 |
|           | 5,5      | 90      | 27,5    | 27,9     | 27,2    | -21.4   | -15,4   | -15,7   | -14,8   | -21      | -16,7   | 20,9  | 40,2  | 0,75 |
| Variation | 1        | 19      | 0,5     | 0,4      | 0.4     | 3,3     | 1.7     | 1.4     | 0,7     | 0,2      | 0,7     | 2,3   | 3,2   | 0,03 |

24





Voltage (V)

-13

-14

-15

-16

-17

-18

-19

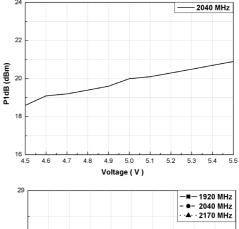
-20

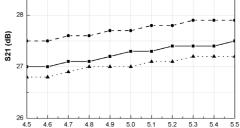
-21

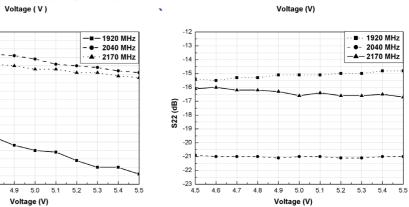
-22 L 4.5

4.6 4.7 4.8 4.9 5.0 5.1 5.2

S11 (dB)









## **Recommended Soldering Reflow Process**

