# AHB5614S9 Data Sheet

*50 ~ 7000 MHz Wide Band Gain Block Amplifier*

## 1. Product Overview

### 1.1 General Description

AHB5614S9 is an ultra-flat gain, low noise, and highly linear gain block amplifier MMIC with single circuit matched over 50 ~ 7000 MHz, being suitable for use in both receiver and transmitter of up to 7000 MHz. The active bias circuit stabilizing the current over process variation is adopted. The amplifier is available in SOT89 package and passes through the stringent 100% DC & RF test via an automated test handler.

### 1.2 Features

- Gain 13.7 dB at 2000 MHz
- Ultra-Flat Gain at 50 ~ 7000 MHz
- NF 2.7 dB at 2000 MHz
- P1dB 19.4 dBm at 2000 MHz
- OIP3 36.3 dBm at 2000 MHz
- MTTF > 100 Years
- Single Supply: +5 V, 82 mA

### 1.3 Applications

- Wide-band application at 50 ~ 7000 MHz and 3000 ~ 7000 MHz
- 5G sub-6 and V2X
- 950 ~ 4000 MHz
- 50 ~ 4000 MHz

### 1.4 Package Profile & RoHS Compliance

| | |
|---|---|
| | RoHS-compliant GREEN Package |
| SOT89, 4.5x4.0 mm$^2$, surface mount | RoHS-compliant |

# 2. Summary on Product Performances

## 2.1 Typical Performance

Supply voltage = +5 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

| Parameter | Typical | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 50 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | MHz |
| Gain | 14.3 | 14.6 | 13.7 | 13.1 | 12.8 | 12.7 | 12.4 | 12.5 | dB |
| S11 | -10.6 | -16.6 | -9.4 | -7.7 | -7.7 | -7.1 | -5.0 | -2.3 | dB |
| S22 | -14.0 | -15.7 | -8.6 | -7.0 | -6.5 | -6.0 | -5.5 | -7.7 | dB |
| Noise Figure[1)] | 2.6 | 2.5 | 2.7 | 3.0 | 3.1 | 3.3 | 3.7 | 4.4 | dB |
| Output IP3[2)] | 40.0 | 36.4 | 36.3 | 33.8 | 31.6 | 30.3 | 25.7 | 23.1 | dBm |
| Output P1dB | 19.4 | 20.1 | 19.4 | 18.5 | 17.8 | 17.3 | 15.5 | 8.8 | dBm |
| Current | 82 | | | | | | | | mA |
| Device Voltage | 5 | | | | | | | | V |

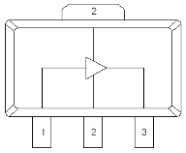
1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of 0 dBm/tone separated by 1 MHz.

## 2.2 Product Specification

Supply voltage = +5 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Frequency | | 2000 | | MHz |
| Gain | | 13.7 | | dB |
| S11 | | -9.4 | | dB |
| S22 | | -8.6 | | dB |
| Noise Figure | | 2.7 | | dB |
| OIP3 | | 36.3 | | dBm |
| P1dB | | 19.4 | | dBm |
| Current | | 82 | | mA |
| Device Voltage | | 5 | | V |

## 2.3 Pin Configuration

| Pin | Description | Simplified Outline |
|---|---|---|
| 1 | RF_IN |  |
| 2 | Ground | |
| 3 | RF_OUT & Bias | |

## 2.4 Absolute Maximum Ratings, $T_A$ = +25 °C

| Parameters | Max. Ratings |
|---|---|
| Operation Case Temperature | -40 to +105 °C |
| Storage Temperature | -40 to +150 °C |
| Device Voltage | +6 V |
| Operation Junction Temperature | +150 °C |
| Input RF Power (At 50 MHz, CW, 50 Ω matched)* | +27 dBm |

The operation of this device in excess of any of these limits may cause permanent damage.
* Refer to the max. input RF power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

## 2.5 Thermal Resistance

| Symbol | Description | Typ | Unit |
|---|---|---|---|
| $R_{th}$ | Thermal resistance from junction to lead | 75 | °C/W |

## 2.6 ESD Classification & Moisture Sensitivity Level

### ESD Classification

| | | |
|---|---|---|
| HBM | Class 1A | Voltage Level: 400 V |

CAUTION: Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

### Moisture Sensitivity Level

MSL 3 at 260 °C reflow

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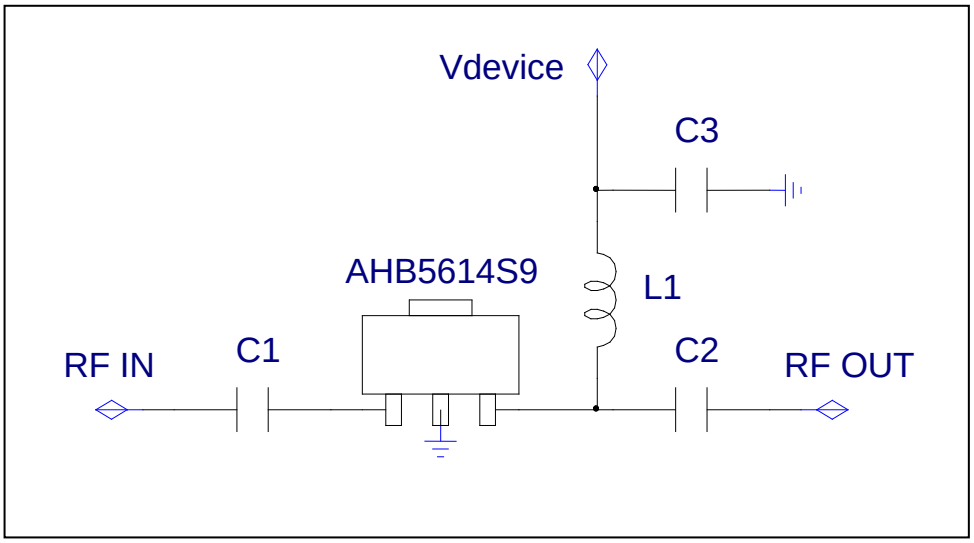
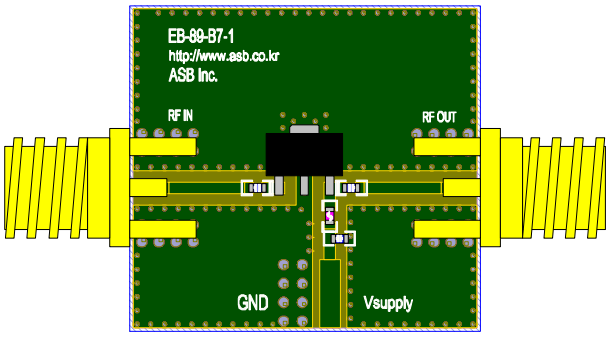
# 3. Application: 50 ~ 7000 MHz, $V_{device}$ = +5 V

## 3.1 Application Circuit & Evaluation Board




Note: 1. The ground via should be located beneath the ground pins.
(Refer to 'Surface Mount Recommendation')




| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, C2 | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C3 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 270 nH | 0402 | RF Choke Inductor | LQH15HSR27G02 | Murata |

## 3.2 Performance Table

Supply voltage = +5 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

| Parameter | Typical | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 50 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | MHz |
| Gain | 14.3 | 14.6 | 13.7 | 13.1 | 12.8 | 12.7 | 12.4 | 12.5 | dB |
| S11 | -10.6 | -16.6 | -9.4 | -7.7 | -7.7 | -7.1 | -5.0 | -2.3 | dB |
| S22 | -14.0 | -15.7 | -8.6 | -7.0 | -6.5 | -6.0 | -5.5 | -7.7 | dB |
| Noise Figure[1)] | 2.6 | 2.5 | 2.7 | 3.0 | 3.1 | 3.3 | 3.7 | 4.4 | dB |
| Output IP3[2)] | 40.0 | 36.4 | 36.3 | 33.8 | 31.6 | 30.3 | 25.7 | 23.1 | dBm |
| Output P1dB | 19.4 | 20.1 | 19.4 | 18.5 | 17.8 | 17.3 | 15.5 | 8.8 | dBm |
| Current | 82 | | | | | | | | mA |
| Device Voltage | 5 | | | | | | | | V |

1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of 0 dBm/tone separated by 1 MHz.

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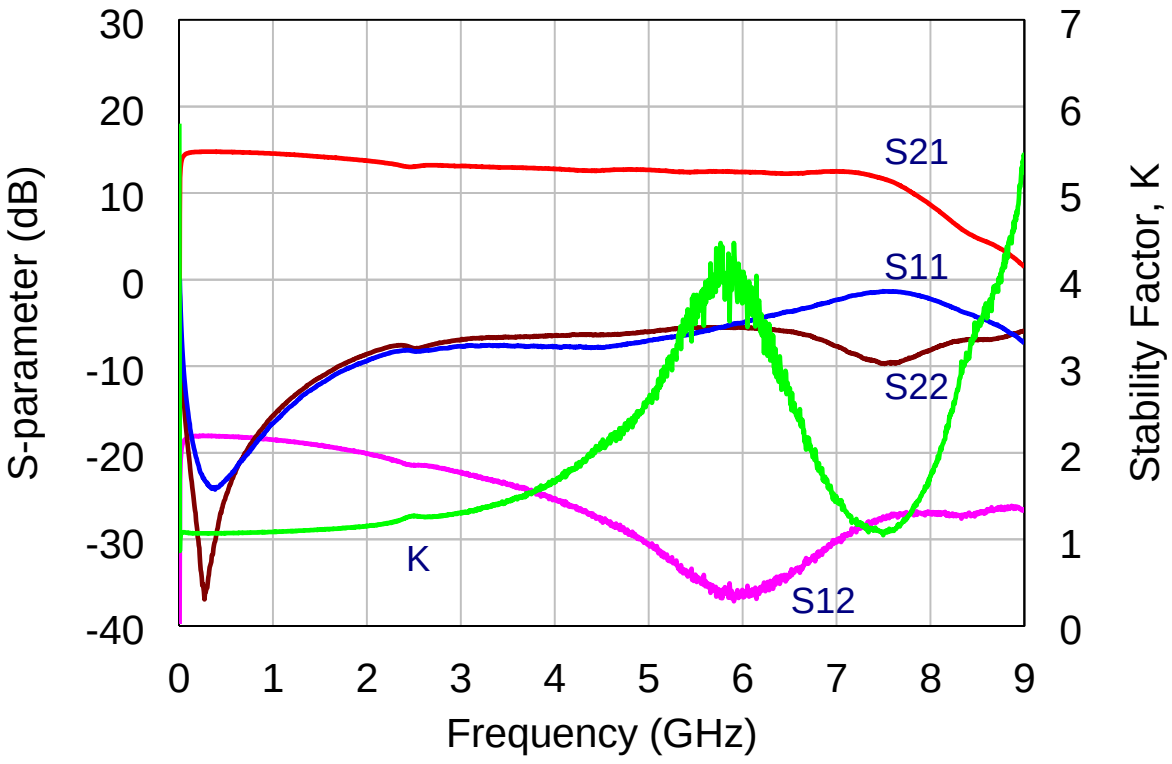
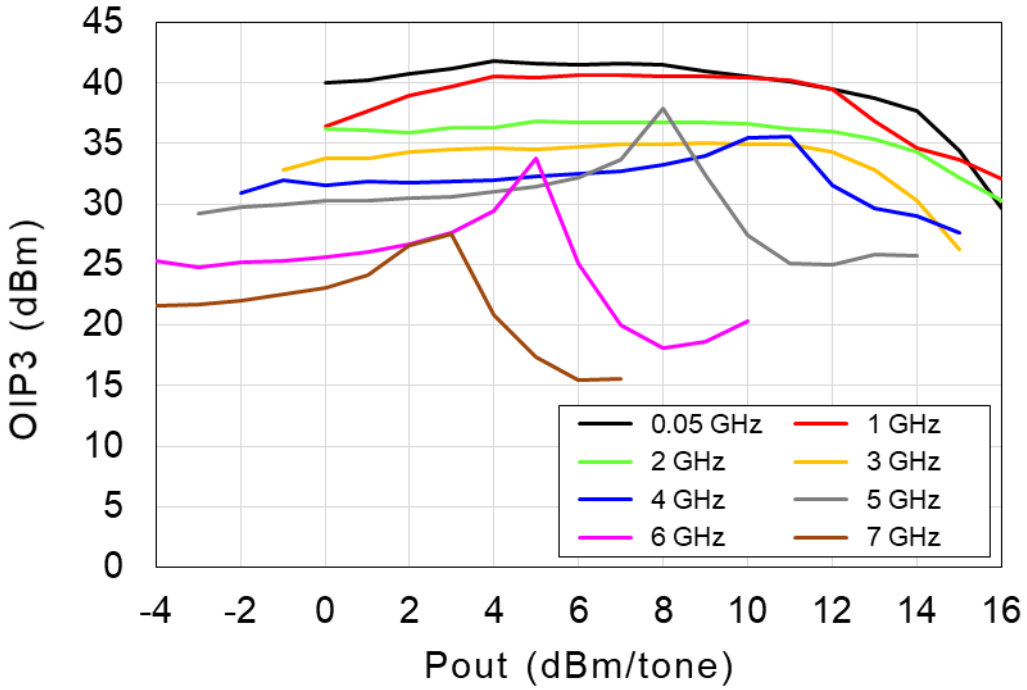
## 3.3 Plot of S-parameter & Stability Factor



### 3.4 OIP3 vs. Pout

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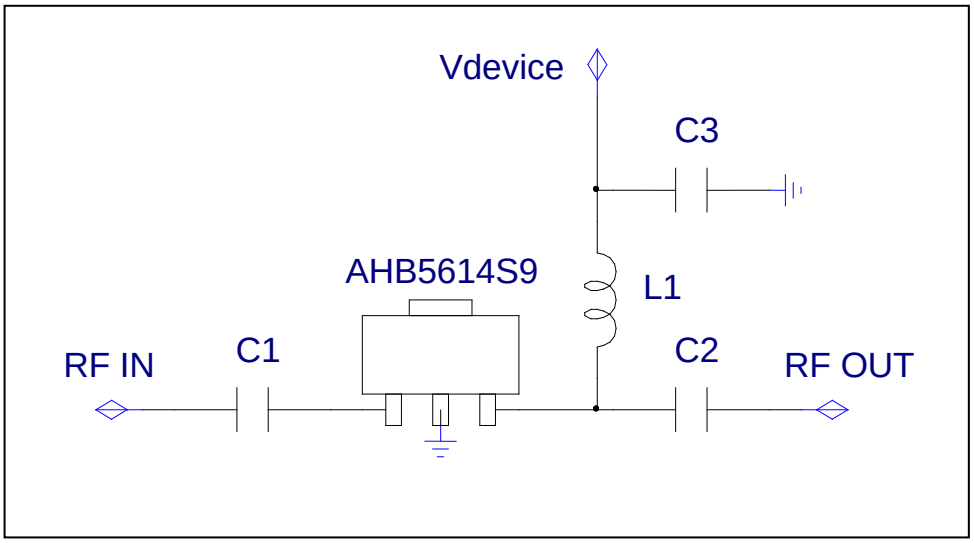
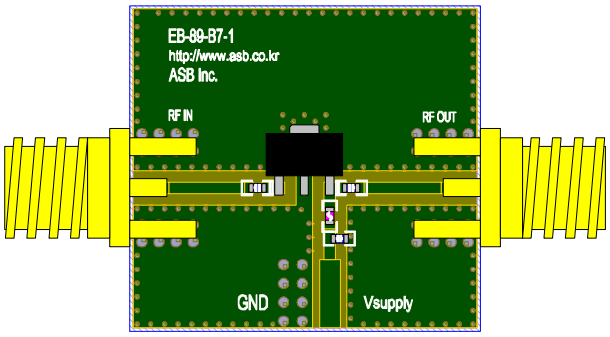
# 4. Application: 50 ~ 7000 MHz, $V_{device}$ = +3 V

## 4.1 Application Circuit & Evaluation Board




Note: 1. The ground via should be located beneath the ground pins.
(Refer to 'Surface Mount Recommendation')




| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, C2 | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C3 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 270 nH | 0402 | RF Choke Inductor | LQH15HSR27G02 | Murata |

## 4.2 Performance Table

Supply voltage = +3 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

| Parameter | Typical | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 50 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | MHz |
| Gain | 13.9 | 14.2 | 13.3 | 12.6 | 12.2 | 12.0 | 11.7 | 11.6 | dB |
| S11 | -10.3 | -15.1 | -8.7 | -7.2 | -7.3 | -6.4 | -4.6 | -2.2 | dB |
| S22 | -13.7 | -14.6 | -8.0 | -6.4 | -5.9 | -5.5 | -5.4 | -8.7 | dB |
| Noise Figure[1)] | 2.5 | 2.5 | 2.7 | 2.9 | 3.1 | 3.3 | 3.7 | 4.3 | dB |
| Output IP3[2)] | 31.1 | 32.3 | 29.9 | 28.8 | 29.1 | 28.6 | 28.1 | 26.7 | dBm |
| Output P1dB | 15.0 | 16.5 | 15.1 | 14.7 | 14.4 | 14.3 | 11.6 | 5.9 | dBm |
| Current | 43 | | | | | | | | mA |
| Device Voltage | 3 | | | | | | | | V |

1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of -3 dBm/tone separated by 1 MHz.

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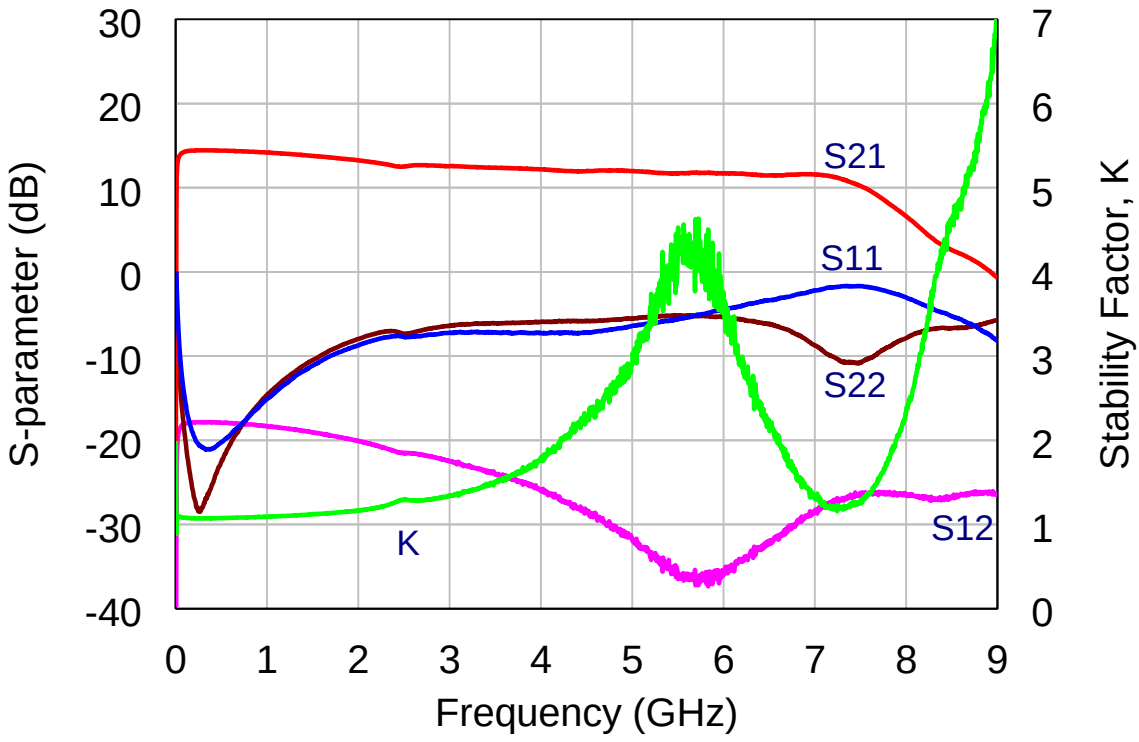
## 4.3 Plot of S-parameter & Stability Factor



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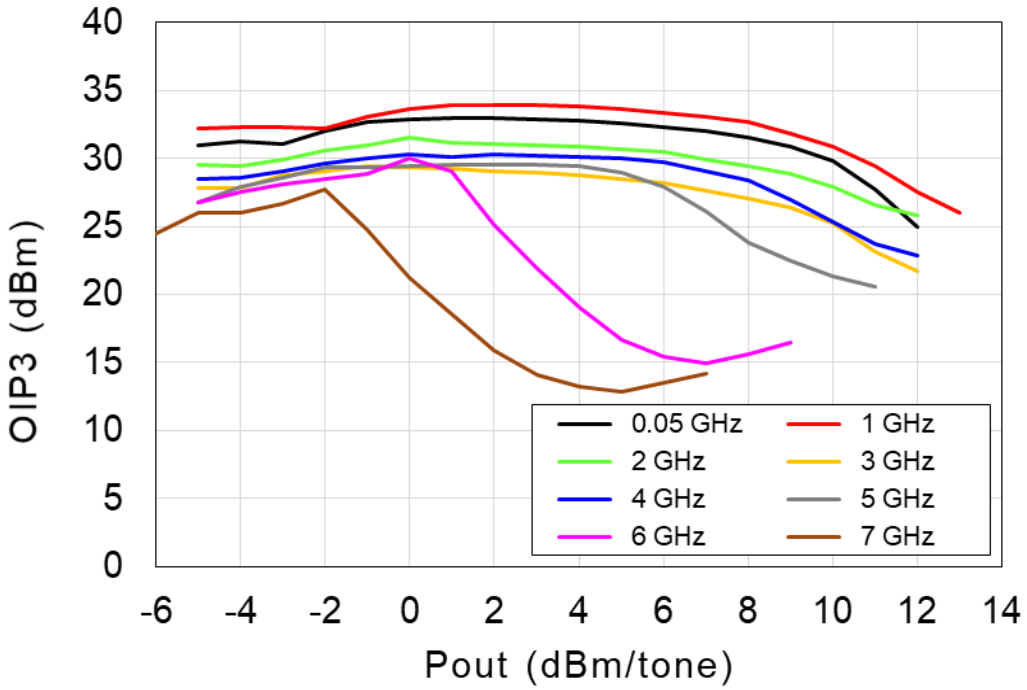


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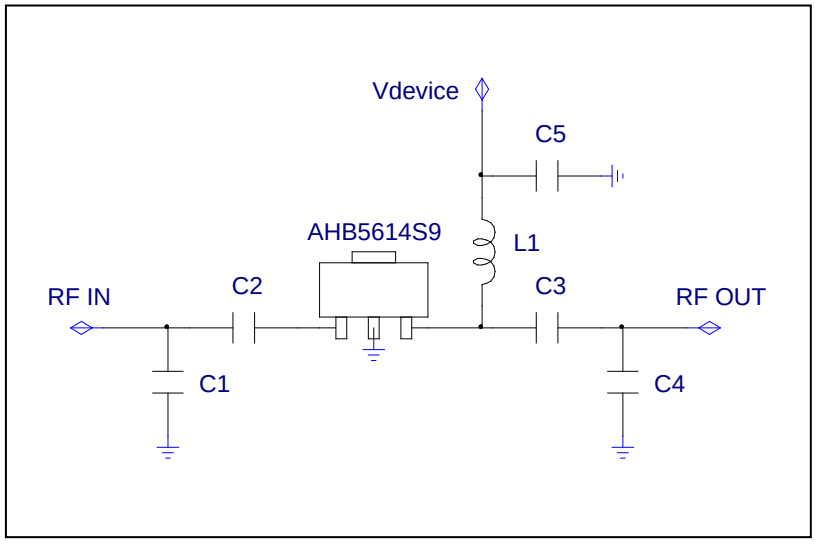
# 5. Application: 3000 ~ 7000 MHz, $V_{device}$ = +5 V

## 5.1 Application Circuit & Evaluation Board

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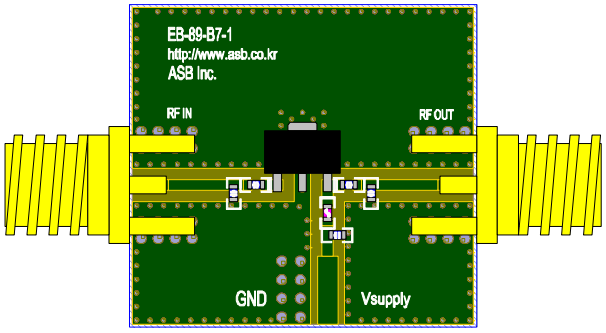



| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, C4 | 0.3 pF | 0402 | Matching Capacitor | GRM1555C1HR30WA | Murata |
| C2, C3 | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C5 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 1 nH | 0402 | RF Choke Inductor | LQG15HS1N0B02 | Murata |

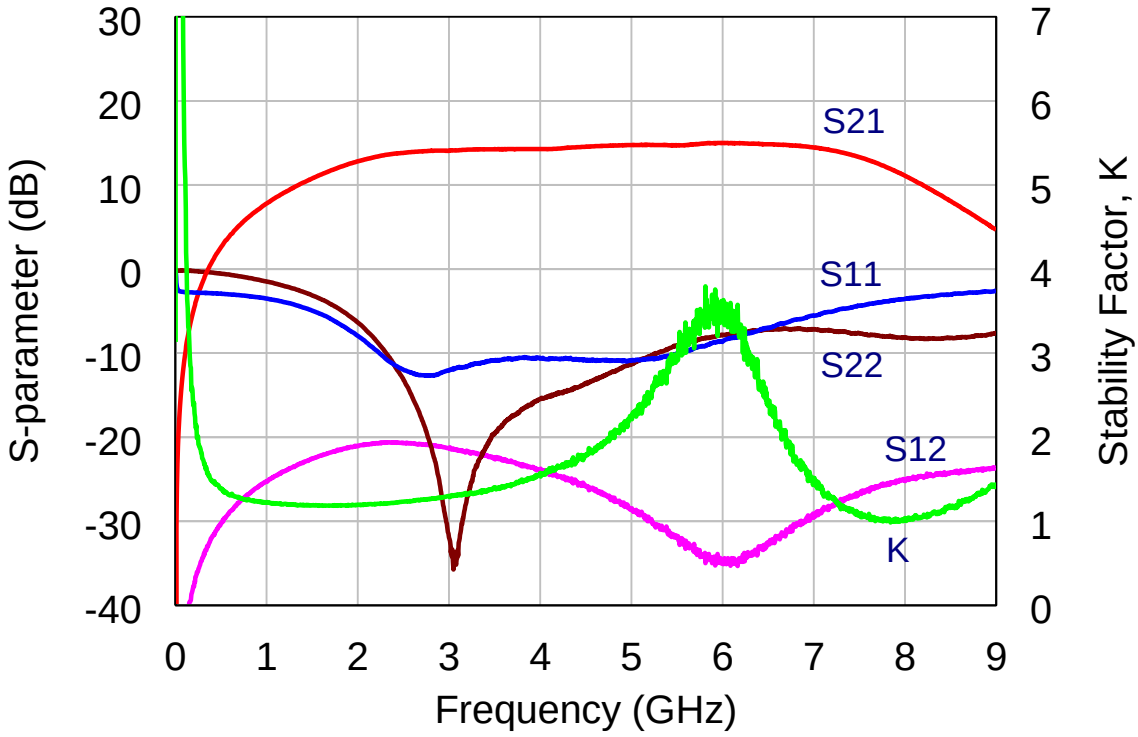
## 5.2 Performance Table

Supply voltage = +5 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

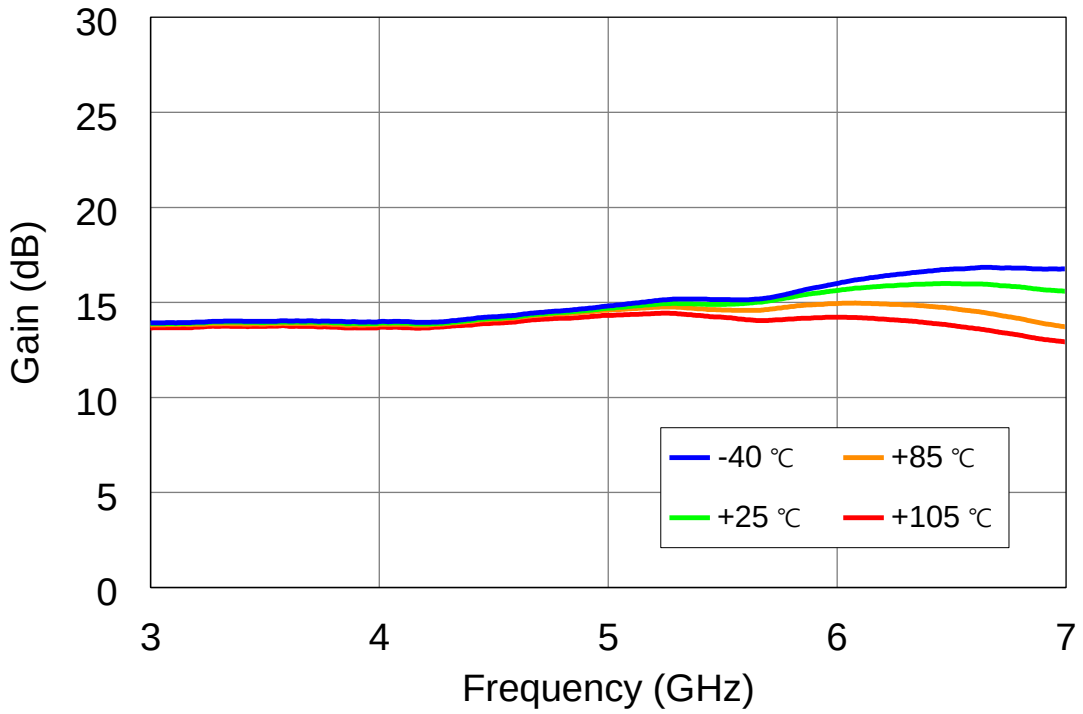
| Parameter | Typical | | | | | Unit |
|---|---|---|---|---|---|---|
| Frequency | 3000 | 4000 | 5000 | 6000 | 7000 | MHz |
| Gain | 14.1 | 14.3 | 14.7 | 15.0 | 14.5 | dB |
| S11 | -12.1 | -10.6 | -10.9 | -8.6 | -5.5 | dB |
| S22 | -31.9 | -15.4 | -11.3 | -7.9 | -7.2 | dB |
| Noise Figure[1)] | 3.0 | 3.1 | 3.2 | 3.5 | 4.3 | dB |
| Output IP3[2)] | 32.2 | 31.5 | 29.5 | 25.6 | 23.3 | dBm |
| Output P1dB | 19.5 | 19.0 | 18.2 | 15.8 | 11.2 | dBm |
| Current | 90 | | | | | mA |
| Device Voltage | 5 | | | | | V |

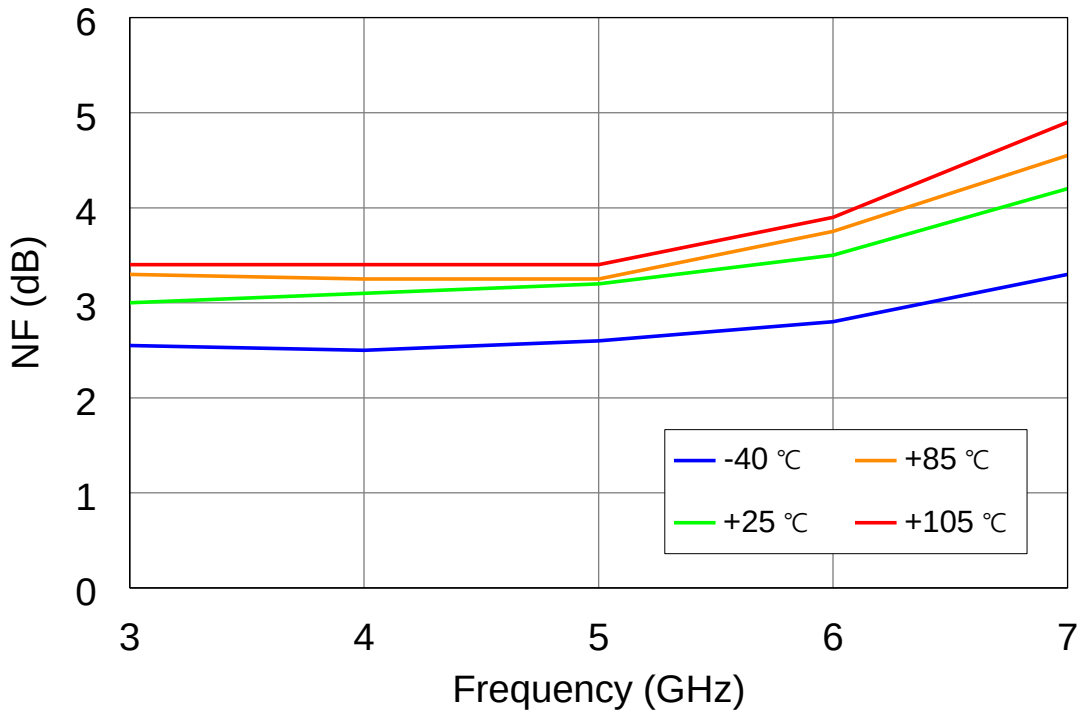
1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of 0 dBm/tone separated by 1 MHz.

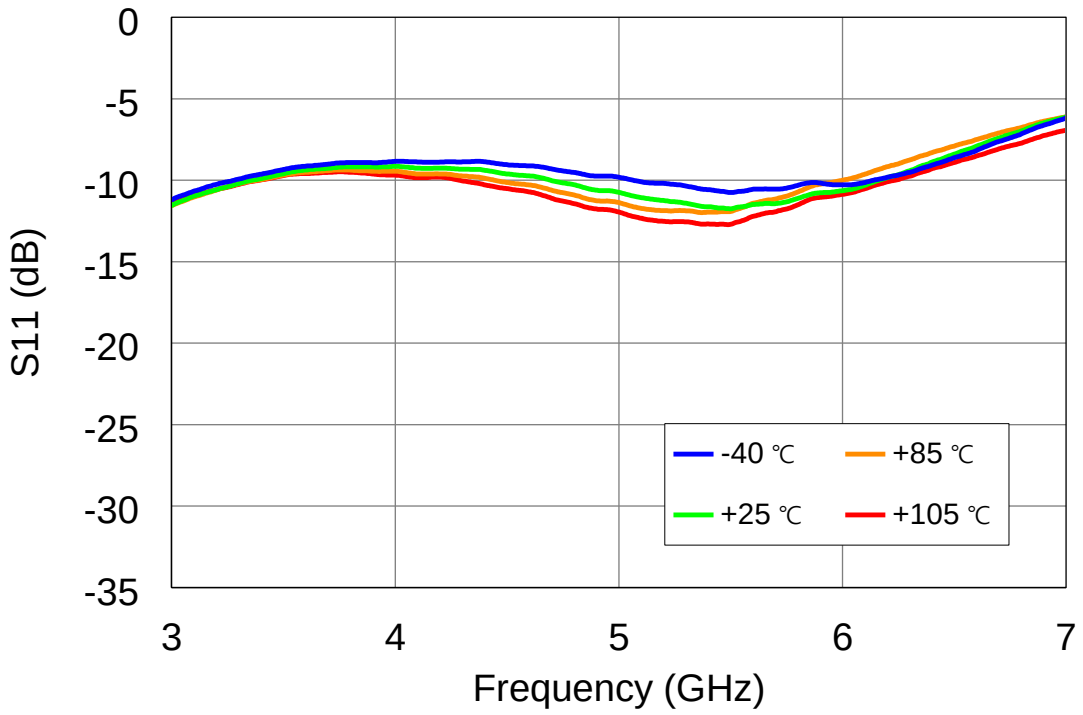
## 5.3 Plot of S-parameter & Stability Factor

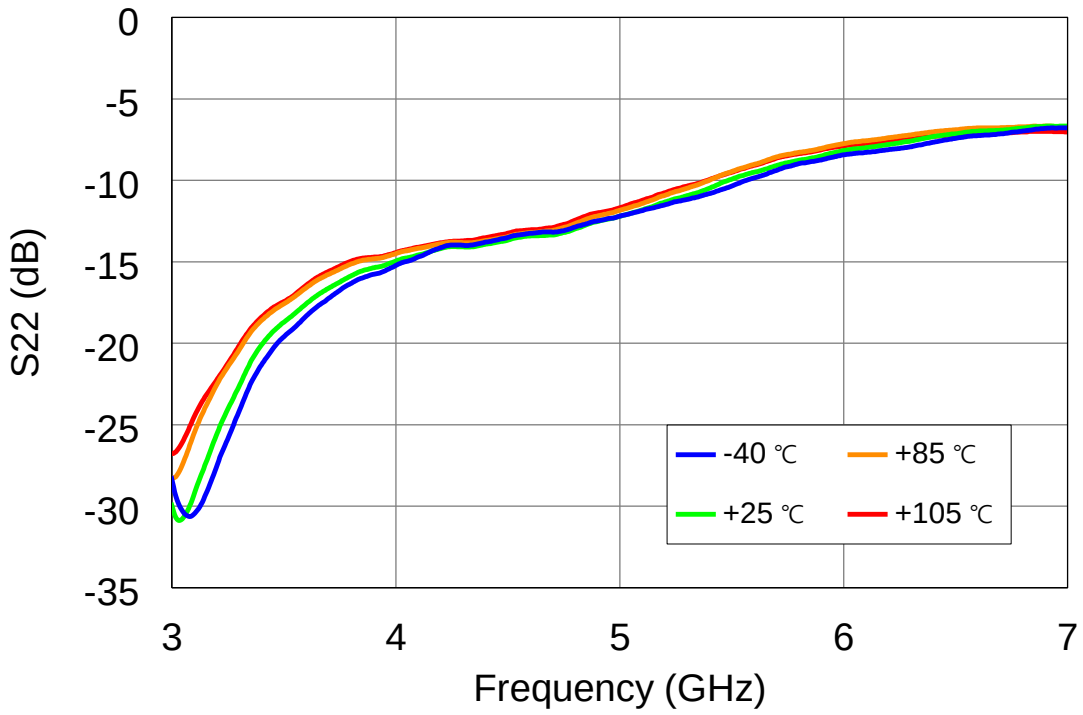


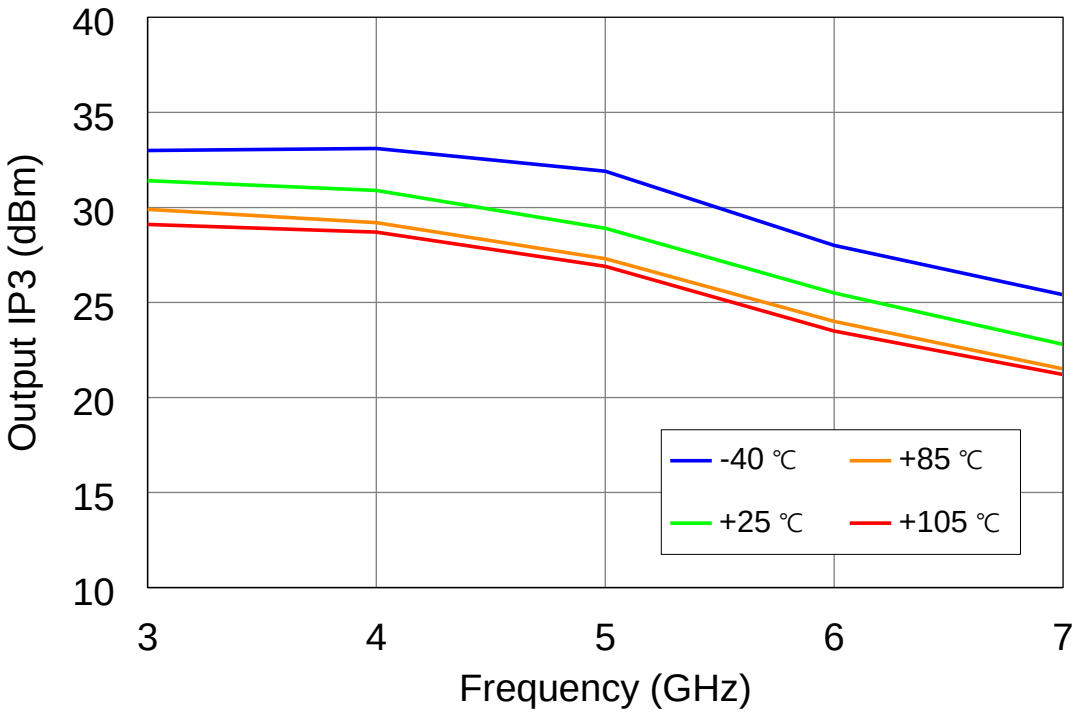
## 5.4 Plots of Performance

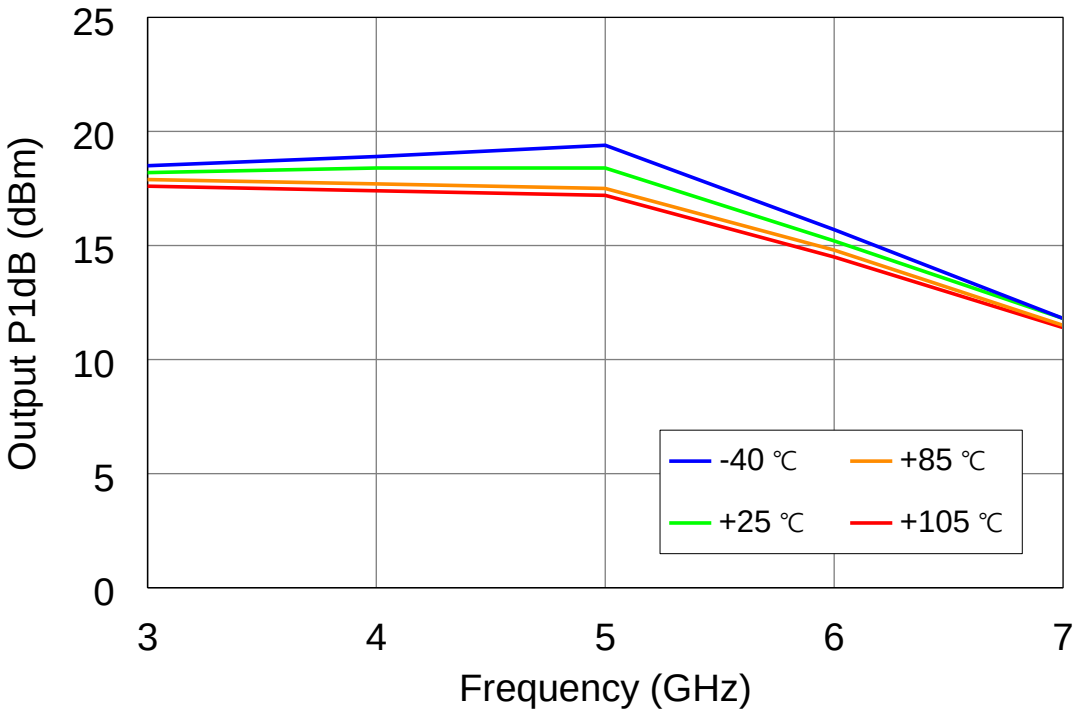


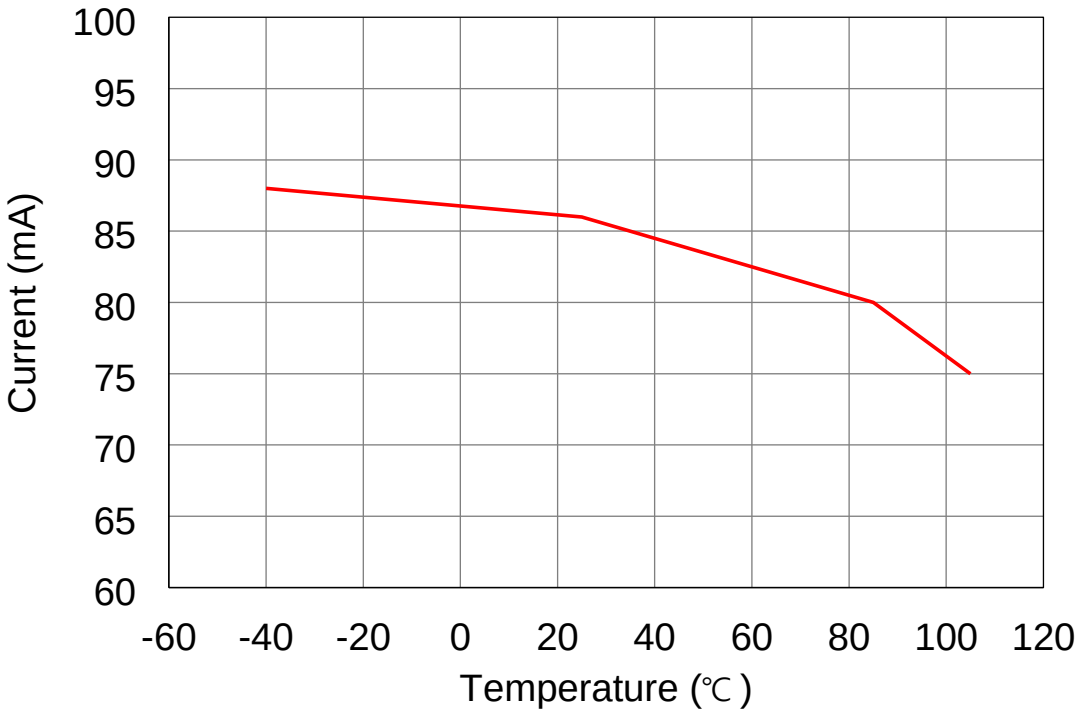



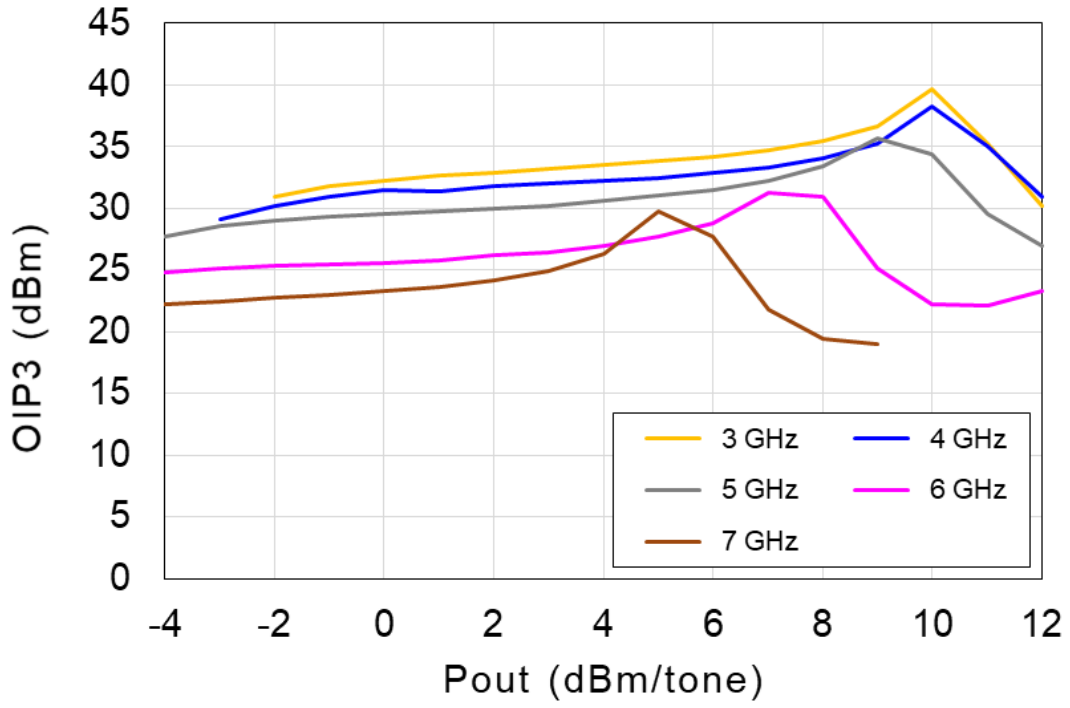

0
-5
-10
-15
-20
-25
-30
-35
S11 (dB)
3
4
5
6
7
Frequency (GHz)
-40 ℃
+85 ℃
+25 ℃
+105 ℃


0
-5
-10
-15
-20
-25
-30
-35
S22 (dB)
3
4
5
6
7
Frequency (GHz)
-40 ℃
+85 ℃
+25 ℃
+105 ℃


Output IP3 (dBm)
40
35
30
25
20
15
10
3
4
5
6
7
Frequency (GHz)
-40 ℃
+85 ℃
+25 ℃
+105 ℃

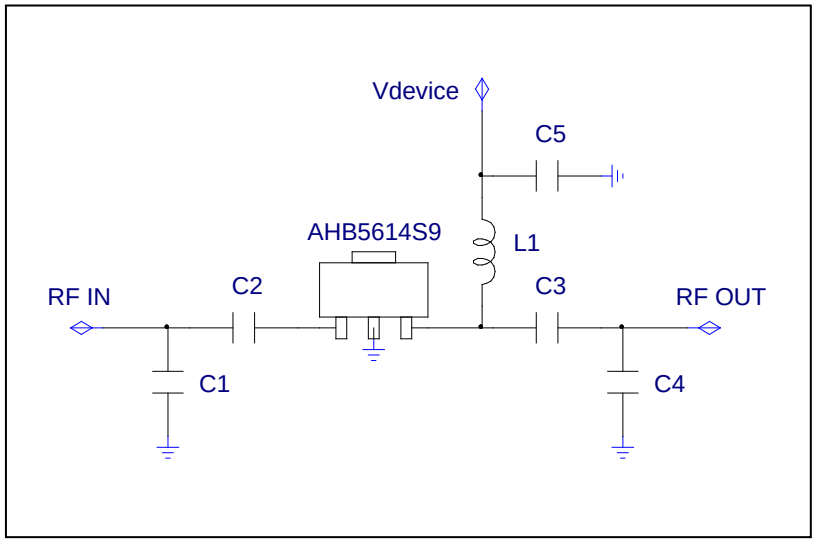

Output P1dB (dBm)
25
20
15
10
5
0
3
4
5
6
7
Frequency (GHz)
-40 ℃
+85 ℃
+25 ℃
+105 ℃


100
95
90
85
80
75
70
65
60
Current (mA)
-60
-40
-20
0
20
40
60
80
100
120
Temperature (℃)


45
40
35
30
25
20
15
10
5
0
OIP3 (dBm)
-4
-2
0
2
4
6
8
10
12
Pout (dBm/tone)
3 GHz
4 GHz
5 GHz
6 GHz
7 GHz

# 6. Application: 3000 ~ 7000 MHz, $V_{device}$ = +3 V

## 6.1 Application Circuit & Evaluation Board

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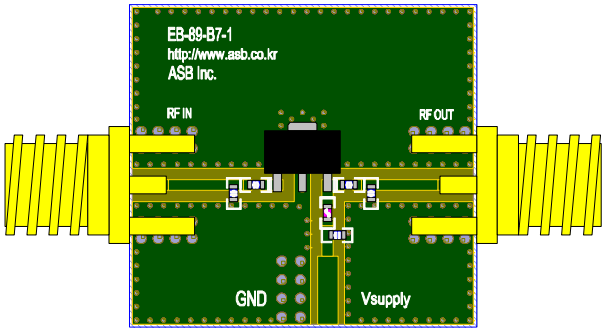


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|---|---|---|
| Layer | Material | Thickness (mm) |
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### Bill of Material

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## 6.2 Performance Table

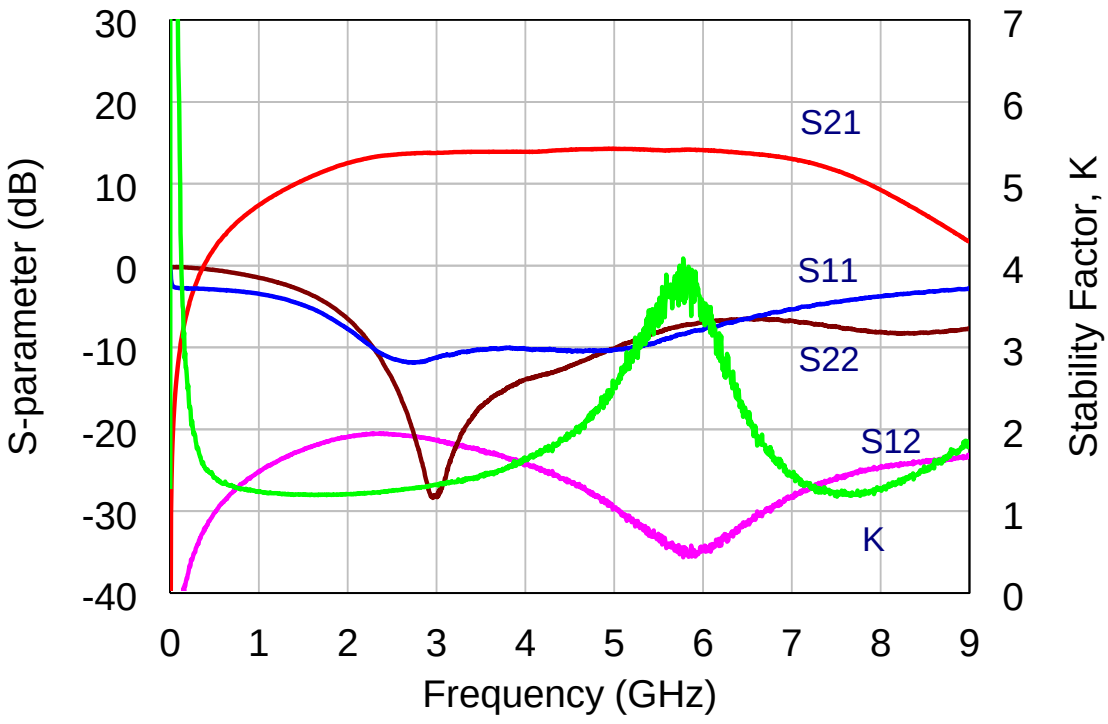
Supply voltage = +3 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

| Parameter | Typical | | | | | Unit |
|---|---|---|---|---|---|---|
| Frequency | 3000 | 4000 | 5000 | 6000 | 7000 | MHz |
| Gain | 13.8 | 13.9 | 14.3 | 14.1 | 13.0 | dB |
| S11 | -11.3 | -10.1 | -10.3 | -7.9 | -5.4 | dB |
| S22 | -28.1 | -13.9 | -10.1 | -6.9 | -6.7 | dB |
| Noise Figure[1)] | 3.0 | 3.0 | 3.2 | 3.5 | 4.3 | dB |
| Output IP3[2)] | 32.5 | 32.7 | 30.0 | 26.7 | 27.0 | dBm |
| Output P1dB | 16.3 | 15.7 | 14.6 | 12.1 | 8.4 | dBm |
| Current | 48 | | | | | mA |
| Device Voltage | 3 | | | | | V |

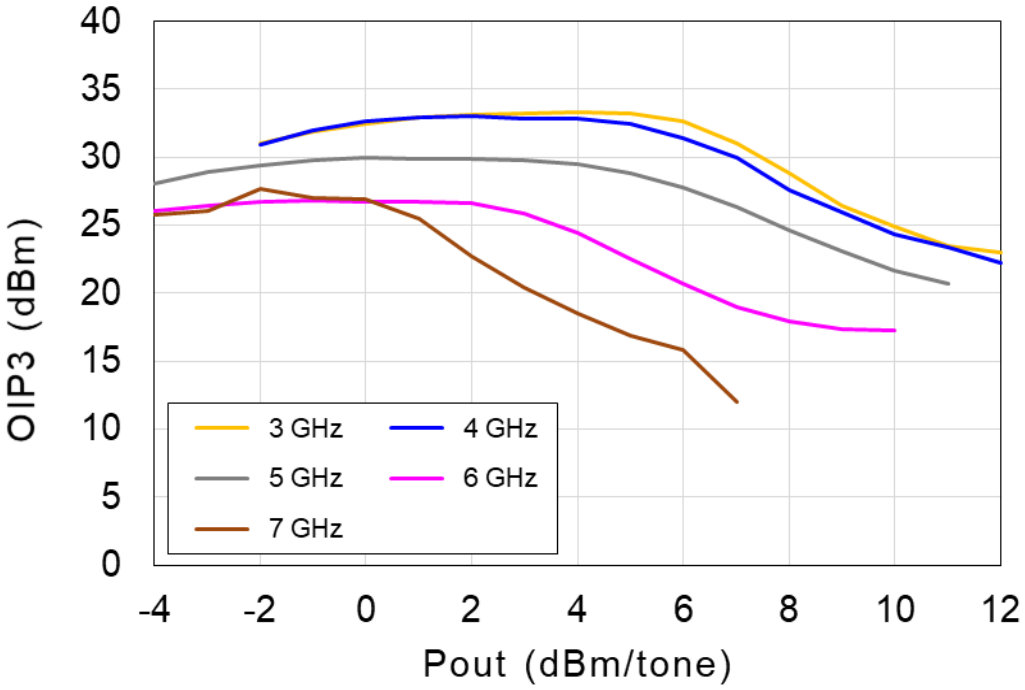
1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of 0 dBm/tone separated by 1 MHz.

.

## 6.3 Plot of S-parameter & Stability Factor



## 6.4 OIP3 vs. Pout

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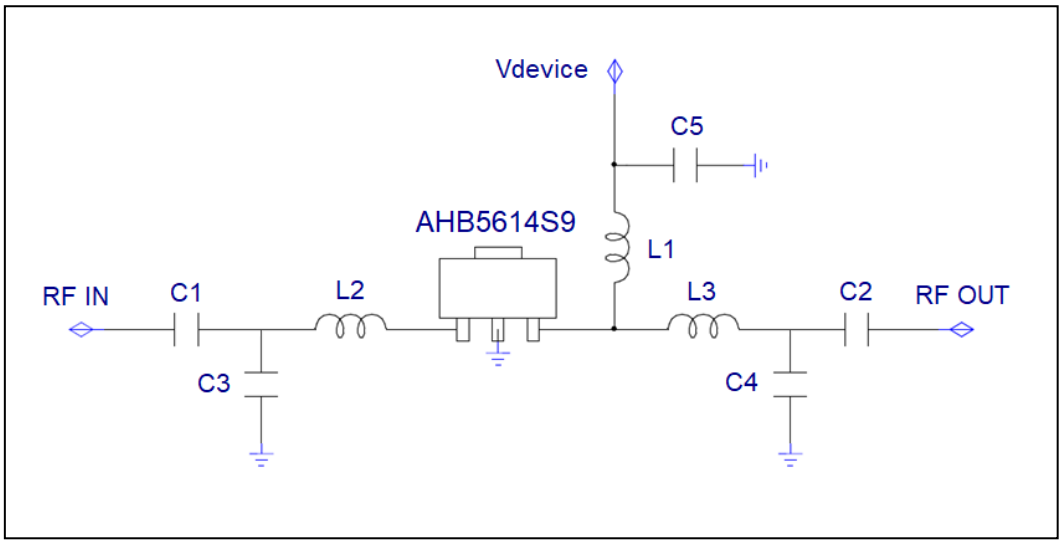
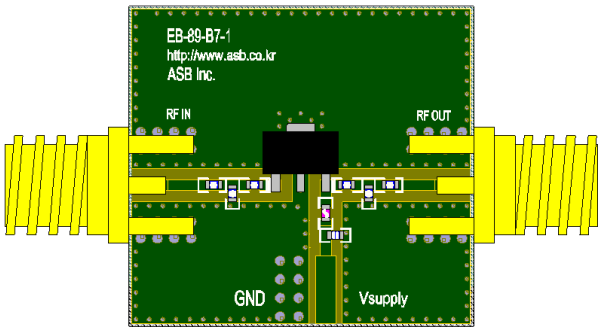
# 7. Application: 950 ~ 4000 MHz, $V_{device}$ = +5 V

## 7.1 Application Circuit & Evaluation Board




Note: 1. The ground via should be located beneath the ground pins.
(Refer to 'Surface Mount Recommendation')




| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, C2 | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C3 | 0.3 pF | 0402 | Matching Capacitor | GRM1555C1HR30WA | Murata |
| C4 | 0.5 pF | 0402 | Matching Capacitor | GRM1555C1HR50WA | Murata |
| C5 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 18 nH | 0402 | RF Choke Inductor | LQG15HN18NG02 | Murata |
| L2, L3 | 1.5 nH | 0402 | Matching Inductor | LQG15HN1N5B02 | Murata |

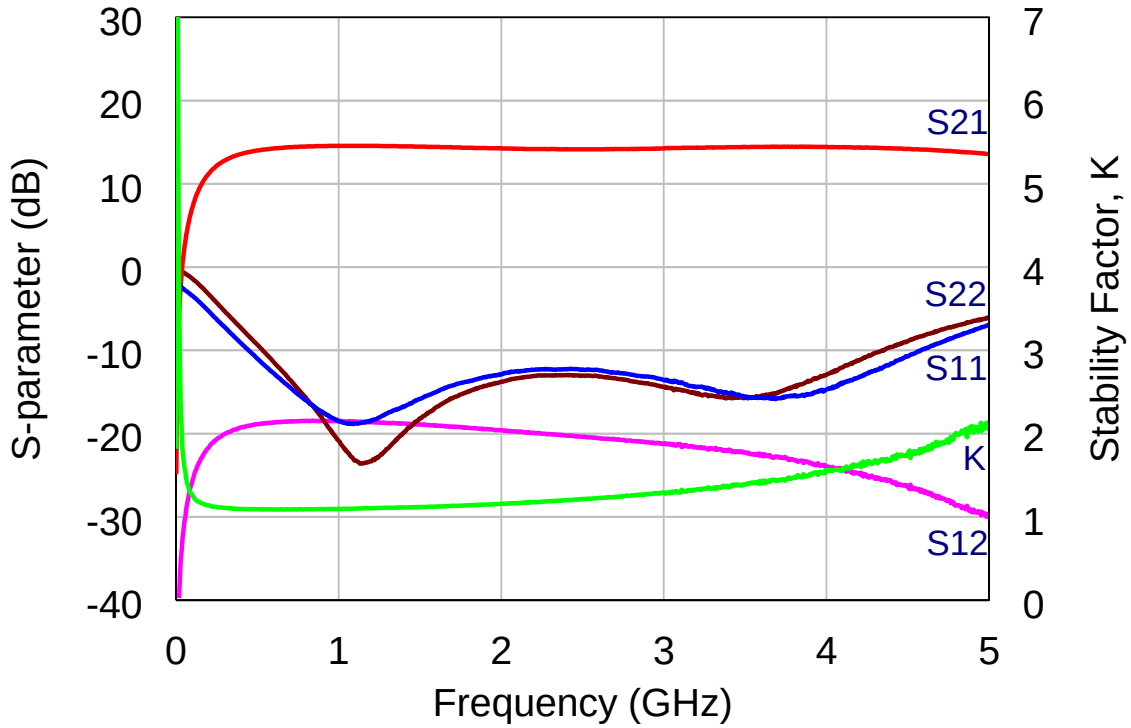
## 7.2 Performance Table

Supply voltage = +3 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

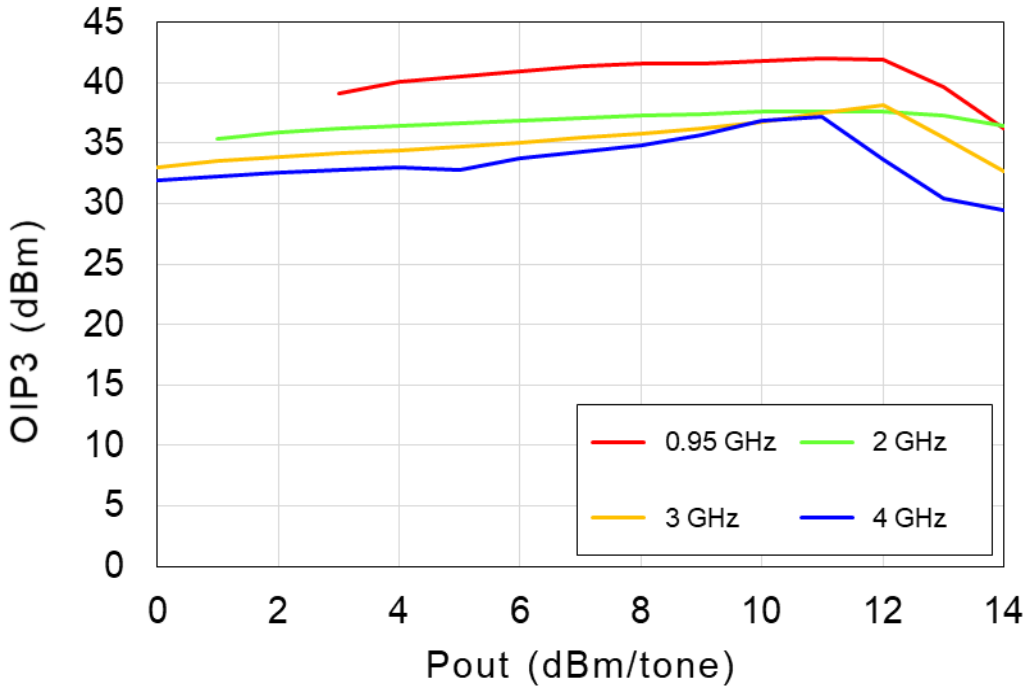
| Parameter | Typical | | | | Unit |
|---|---|---|---|---|---|
| Frequency | 950 | 2000 | 3000 | 4000 | MHz |
| Gain | 14.6 | 14.3 | 14.3 | 14.4 | dB |
| S11 | -18.0 | -12.9 | -13.6 | -14.7 | dB |
| S22 | -19.6 | -13.8 | -14.4 | -13.0 | dB |
| Noise Figure[1)] | 2.5 | 2.7 | 2.8 | 2.9 | dB |
| Output IP3[2)] | 40.1 | 36.5 | 34.5 | 33.0 | dBm |
| Output P1dB | 20.1 | 20.2 | 19.7 | 19.0 | dBm |
| Current | 87 | | | | mA |
| Device Voltage | 5 | | | | V |

1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

## 7.3 Plot of S-parameter & Stability Factor



## 7.4 OIP3 vs. Pout

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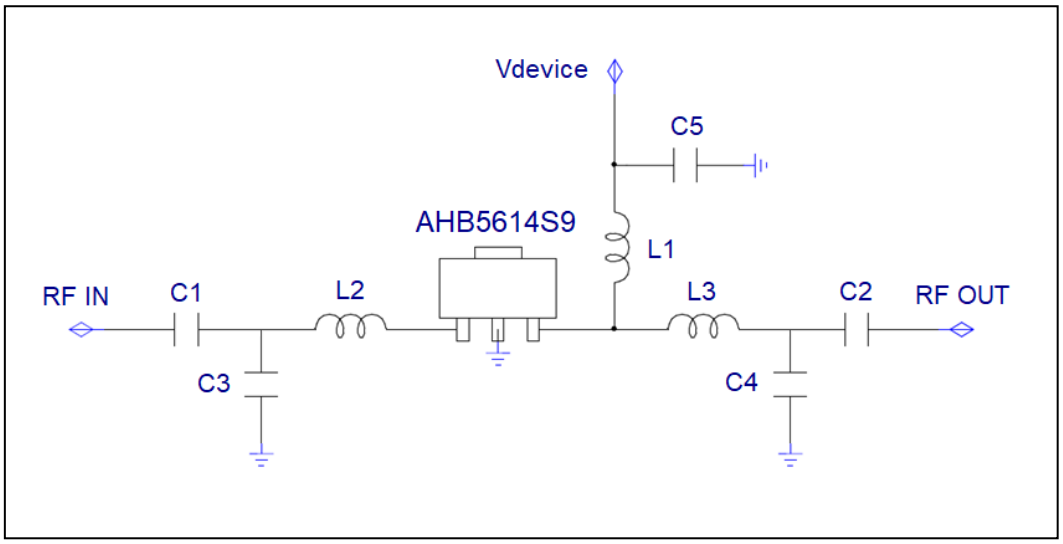
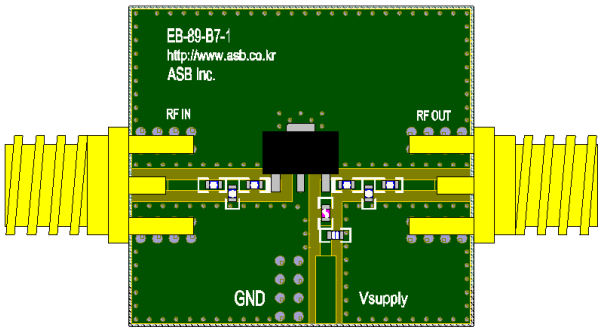
# 8. Application: 950 ~ 4000 MHz, $V_{device}$ = +3 V

## 8.1 Application Circuit & Evaluation Board




Note: 1. The ground via should be located beneath the ground pins.
(Refer to 'Surface Mount Recommendation')




| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, C2 | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C3 | 0.3 pF | 0402 | Matching Capacitor | GRM1555C1HR30WA | Murata |
| C4 | 0.5 pF | 0402 | Matching Capacitor | GRM1555C1HR50WA | Murata |
| C5 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 18 nH | 0402 | RF Choke Inductor | LQG15HN18NG02 | Murata |
| L2, L3 | 1.5 nH | 0402 | Matching Inductor | LQG15HN1N5B02 | Murata |

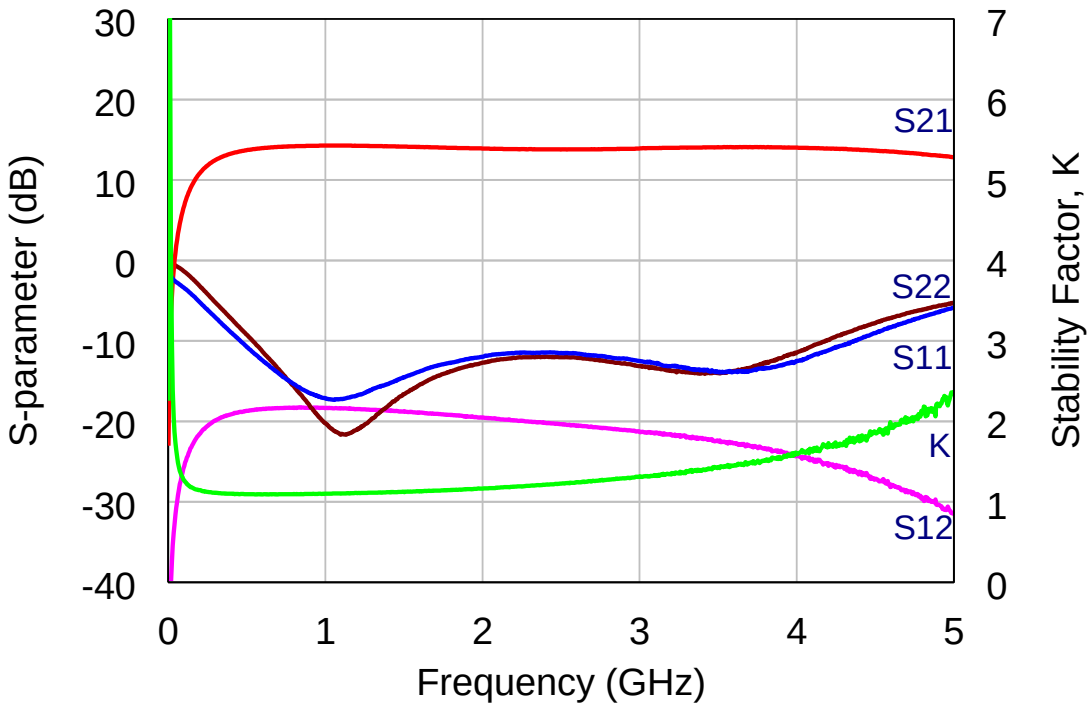
## 8.2 Performance Table

Supply voltage = +3 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

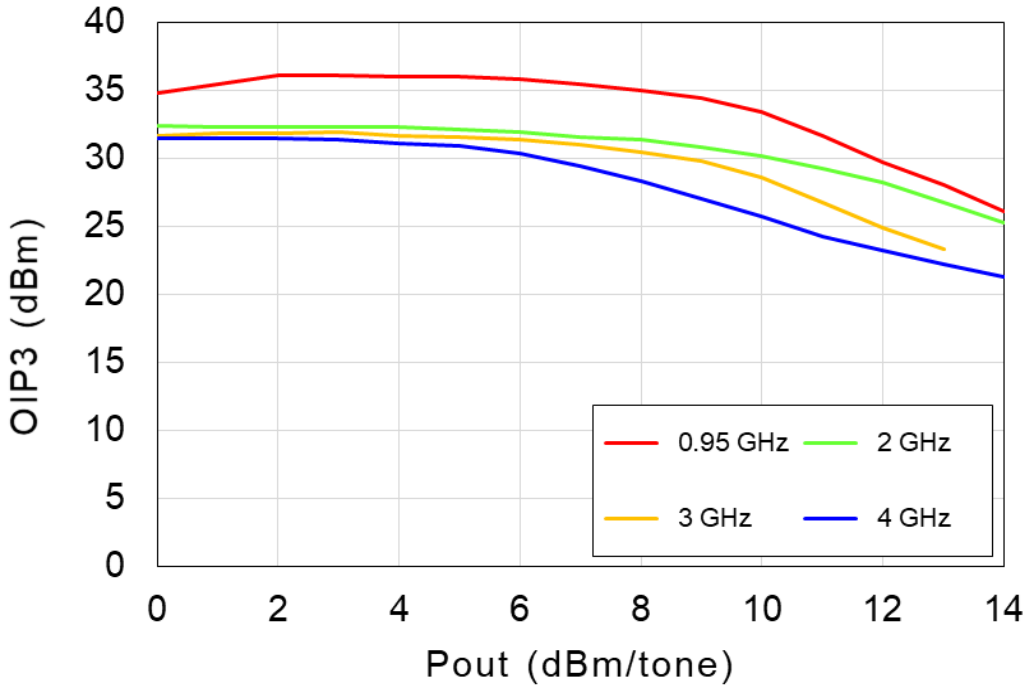
| Parameter | Typical | | | | Unit |
|---|---|---|---|---|---|
| Frequency | 950 | 2000 | 3000 | 4000 | MHz |
| Gain | 14.3 | 13.9 | 13.9 | 14.0 | dB |
| S11 | -16.9 | -12.0 | -12.5 | -12.5 | dB |
| S22 | -19.3 | -12.7 | -13.1 | -11.5 | dB |
| Noise Figure[1)] | 2.5 | 2.6 | 2.7 | 2.8 | dB |
| Output IP3[2)] | 36.1 | 32.3 | 31.7 | 31.2 | dBm |
| Output P1dB | 17.0 | 16.5 | 16.5 | 15.6 | dBm |
| Current | 48 | | | | mA |
| Device Voltage | 3 | | | | V |

1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

## 8.3 Plot of S-parameter & Stability Factor



## 8.4 OIP3 vs. Pout

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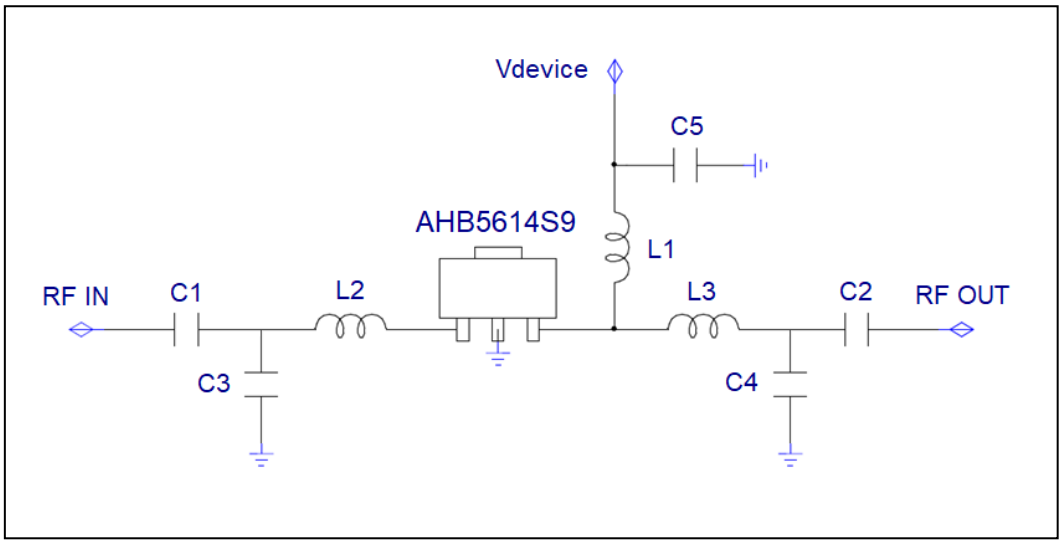
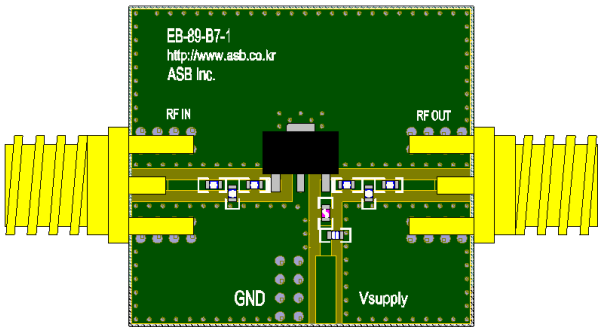
# 9. Application: 50 ~ 4000 MHz, $V_{device}$ = +5 V

## 9.1 Application Circuit & Evaluation Board




Note: 1. The ground via should be located beneath the ground pins.
(Refer to 'Surface Mount Recommendation')




| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C2 | 220 pF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C3 | 0.3 pF | 0402 | Matching Capacitor | GRM1555C1HR30WA | Murata |
| C4 | 0.5 pF | 0402 | Matching Capacitor | GRM1555C1HR50WA | Murata |
| C5 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 270 nH | 0402 | RF Choke Inductor | LQH15HSR27G02 | Murata |
| L2, L3 | 1.5 nH | 0402 | Matching Inductor | LQG15HN1N5B02 | Murata |

## 9.2 Performance Table

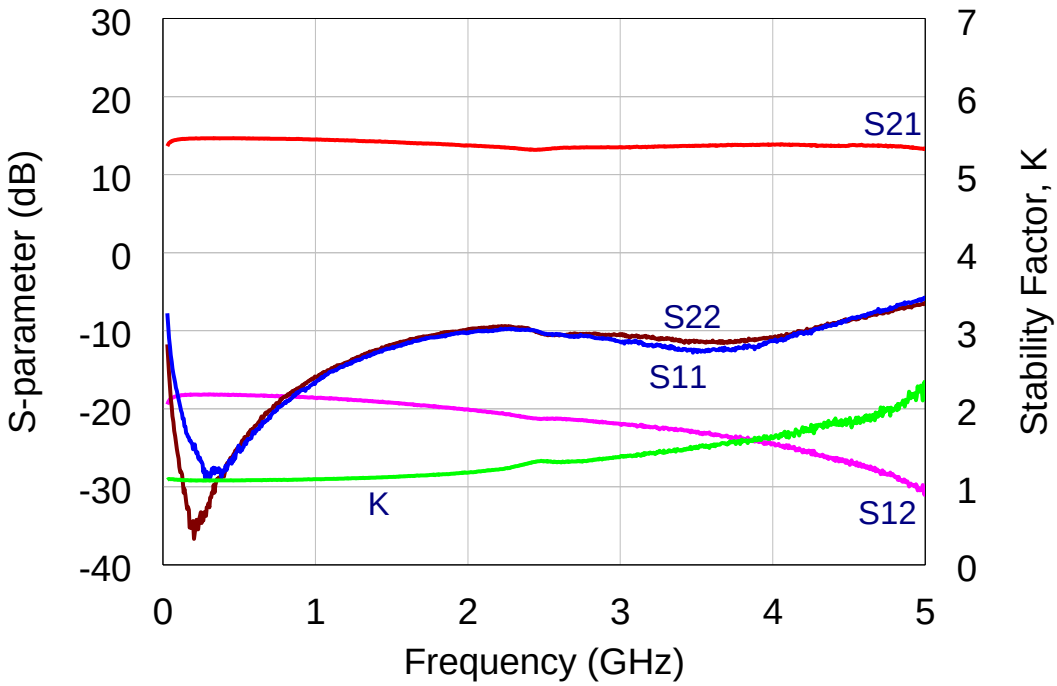
Supply voltage = +5 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

| Parameter | Typical | | | | | Unit |
|---|---|---|---|---|---|---|
| Frequency | 50 | 950 | 2000 | 3000 | 4000 | MHz |
| Gain | 14.3 | 14.5 | 13.7 | 13.5 | 13.8 | dB |
| S11 | -12.5 | -16.5 | -9.7 | -11.0 | -11.0 | dB |
| S22 | -18.0 | -15.0 | -9.5 | -10.5 | -10.0 | dB |
| Noise Figure[1)] | 2.5 | 2.6 | 2.7 | 2.8 | 2.9 | dB |
| Output IP3[2)] | 36.5 | 35.7 | 34.5 | 33.6 | 31.6 | dBm |
| Output P1dB | 19.0 | 20.0 | 20.0 | 19.0 | 19.0 | dBm |
| Current | 80 | | | | | mA |
| Device Voltage | 5 | | | | | V |

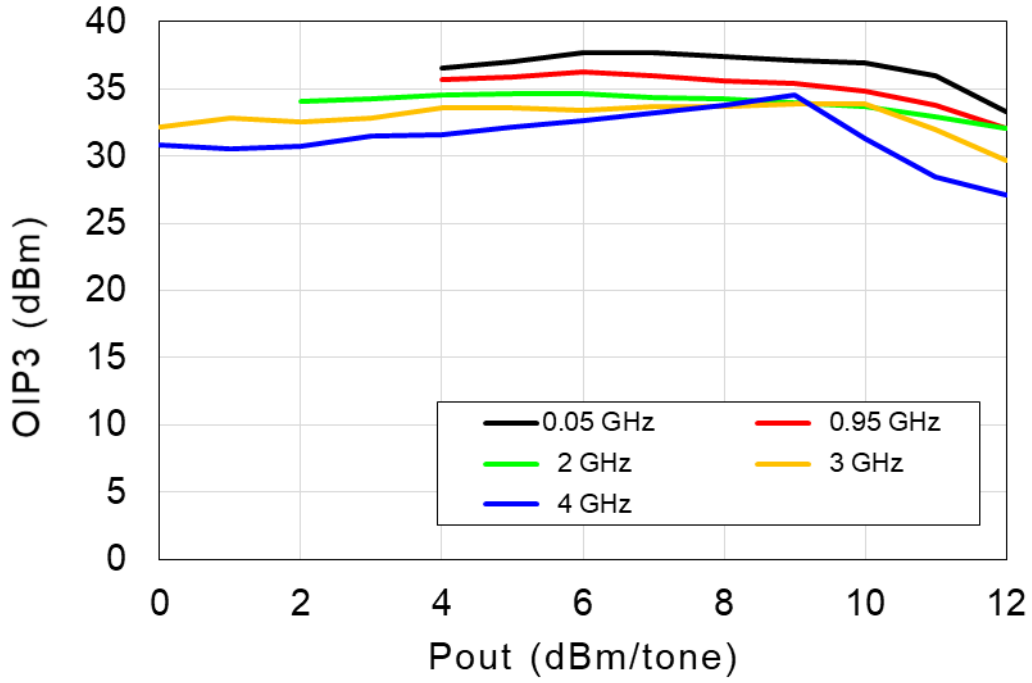
1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

.

## 9.3 Plot of S-parameter & Stability Factor



## 9.4 OIP3 vs. Pout

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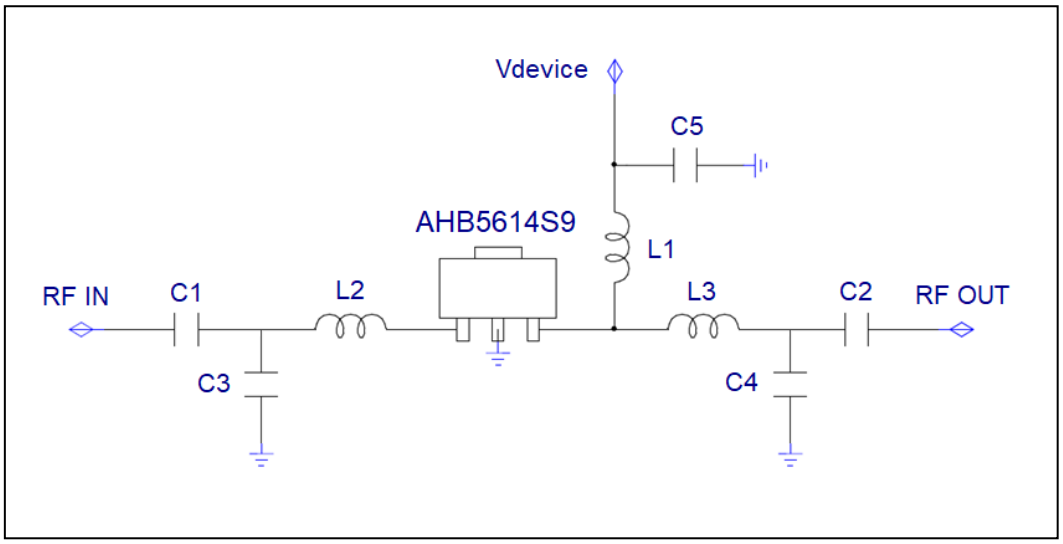
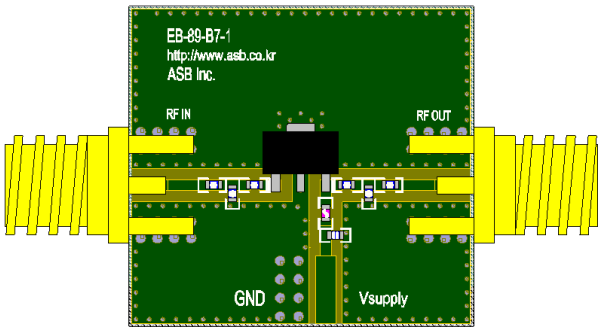
# 10. Application: 50 ~ 4000 MHz, $V_{device}$ = +3 V

## 10.1 Application Circuit & Evaluation Board




Note: 1. The ground via should be located beneath the ground pins.
(Refer to 'Surface Mount Recommendation')




| PCB Information (EB No.: EB-89-B7-1, 20.5x19 mm²) | | |
|---|---|---|
| Layer | Material | Thickness (mm) |
| Top | Copper | 0.0175 |
| Dielectric | Rogers RO4003 | 0.305 |
| Inner | Copper | 0.0175 |
| Dielectric | FR4 | 0.4 |
| Bottom | Copper | 0.0175 |

### Bill of Material

| Symbol | Value | Size(Inch) | Description | Part Number | Manufacturer |
|---|---|---|---|---|---|
| AHB5614S9 | - | - | MMIC Amplifier | - | ASB |
| C1, | 1 nF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C2 | 220 pF | 0402 | DC blocking Capacitor | GRM1555C1H102FA | Murata |
| C3 | 0.3 pF | 0402 | Matching Capacitor | GRM1555C1HR30WA | Murata |
| C4 | 0.5 pF | 0402 | Matching Capacitor | GRM1555C1HR50WA | Murata |
| C5 | 1 μF | 0402 | Decoupling Capacitor | GRM155C71C105KE | Murata |
| L1 | 270 nH | 0402 | RF Choke Inductor | LQH15HSR27G02 | Murata |
| L2, L3 | 1.5 nH | 0402 | Matching Inductor | LQG15HN1N5B02 | Murata |

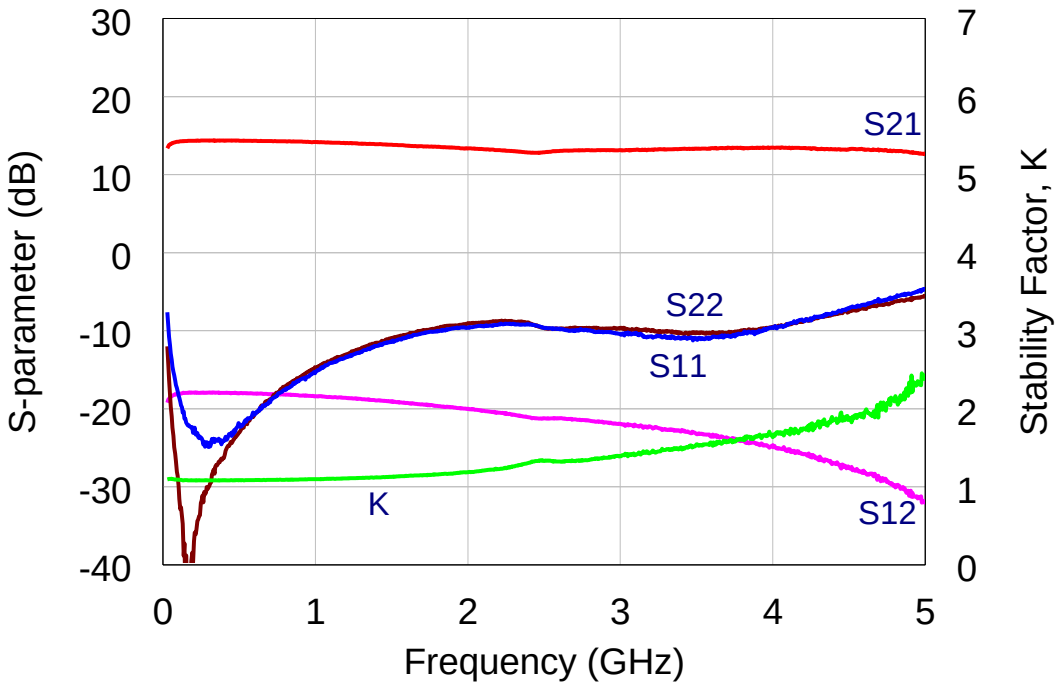
## 10.2 Performance Table

Supply voltage = +3 V, $T_A$ = +25 °C, $Z_O$ = 50 Ω.

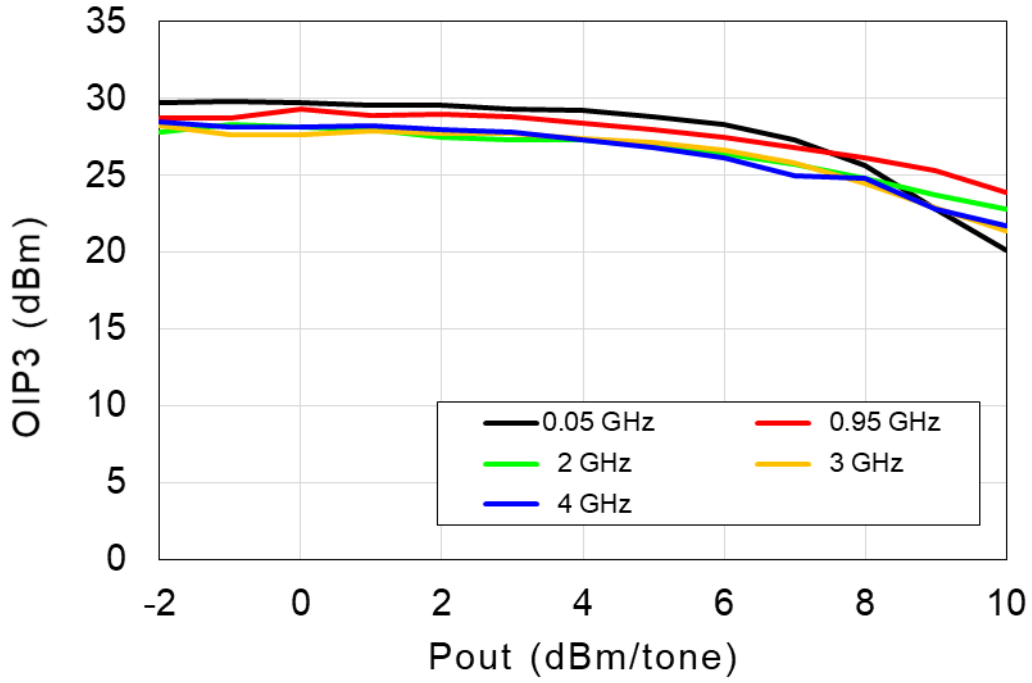
| Parameter | Typical | | | | | Unit |
|---|---|---|---|---|---|---|
| Frequency | 50 | 950 | 2000 | 3000 | 4000 | MHz |
| Gain | 14.0 | 14.0 | 13.3 | 13.0 | 13.3 | dB |
| S11 | -12.7 | -15.0 | -9.3 | -10.0 | -9.5 | dB |
| S22 | -19.0 | -14.2 | -8.8 | -9.8 | -9.0 | dB |
| Noise Figure[1)] | 2.6 | 2.6 | 2.8 | 2.8 | 2.9 | dB |
| Output IP3[2)] | 29.2 | 28.4 | 27.3 | 27.4 | 27.3 | dBm |
| Output P1dB | 14.3 | 14.7 | 15.8 | 15.8 | 15.3 | dBm |
| Current | 43 | | | | | mA |
| Device Voltage | 3 | | | | | V |

1) Noise figure is measured at the connectors on the board (i.e. not de-embedded).
2) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

## 10.3 Plot of S-parameter & Stability Factor



## 10.4 OIP3 vs. Pout

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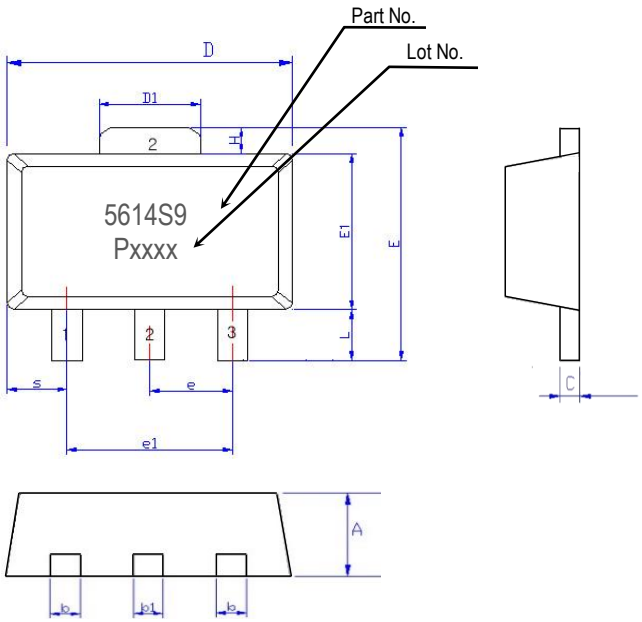
## ▶ Customized Application Circuit Support

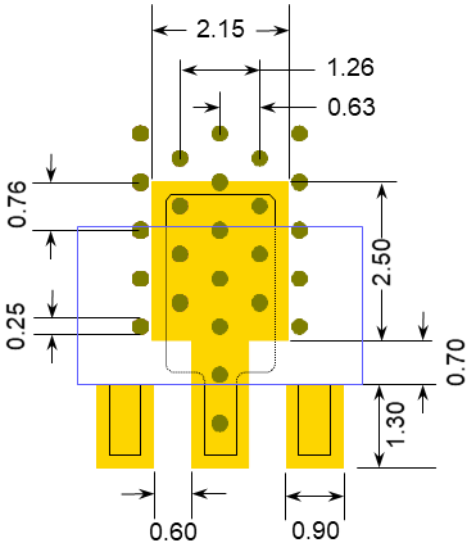
Customized application circuit (reference design) with respect to application frequency, impedance, gain, linearity, and bias condition can be supported upon customer's request. Please feel free to contact us at sales@asb.co.kr.

## 11. Package Outline (SOT89, 4.5x4.0x1.5 mm)




| 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 |

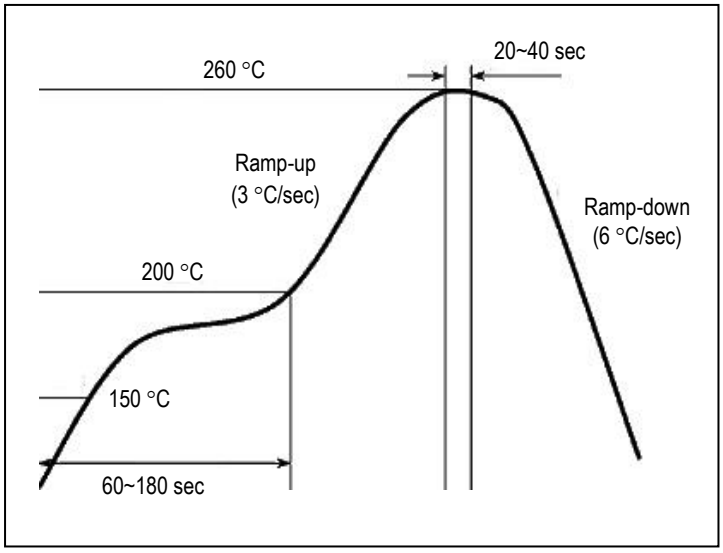
## 12. Surface Mount Recommendation (In mm)




NOTE

1. The number and size of ground via holes in a circuit board are 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.

## 13. Recommended Soldering Reflow Profile




*(End of Datasheet)*

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