# ASW235

## 5 ~ 6000 MHz MMIC Amplifier

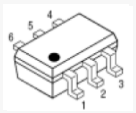
## Features

- 19.5 dB Gain at 2 GHz
- 18 dBm P1dB at 2 GHz
- 30.5 dBm Output IP3 at 2 GHz
- 3.5 dB NF at 2 GHz
- MTTF > 100 Years
- Single Supply

## Description

The ASW235, a power amplifier MMIC, has a high linearity, high gain, and high efficiency over a wide range of frequency, being suitable for use in both receiver and transmitter of telecommunication systems up to 6 GHz. The amplifier is available in a SOT363 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant



Package Style: SOT363

## Application Circuit

- 5 ~ 140 MHz
- 500 ~ 2700 MHz
- IF

## Typical Performance

(Supply Voltage = +4.65 V, $T_A$ = +25 °C, $Z_0$ = 50 Ω)

| Parameters | Units | Typical | | |
|---|---|---|---|---|
| Frequency | MHz | 900 | 2000 | 2700 |
| Gain | dB | 23.0 | 19.5 | 17.5 |
| S11 | dB | -13 | -15 | -18 |
| S22 | dB | -10 | -12 | -12 |
| Output IP3[1)] | dBm | 29.0 | 30.5 | 30.0 |
| Noise Figure | dB | 3.3 | 3.5 | 3.9 |
| Output P1dB | dBm | 16 | 18 | 17 |
| Current | mA | 46 | 46 | 46 |
| Device Voltage | V | +4.65 | +4.65 | +4.65 |

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

## Product Specifications

| Parameters | Units | Min | Typ | Max |
|---|---|---|---|---|
| Testing Frequency | MHz | | 2000 | |
| Gain | dB | | 19.5 | |
| S11 | dB | | -15 | |
| S22 | dB | | -12 | |
| Output IP3 | dBm | | 30.5 | |
| Noise Figure | dB | | 3.5 | |
| Output P1dB | dBm | | 18 | |
| Current | mA | | 46 | |
| Device Voltage | V | | +4.65 | |

## Absolute Maximum Ratings

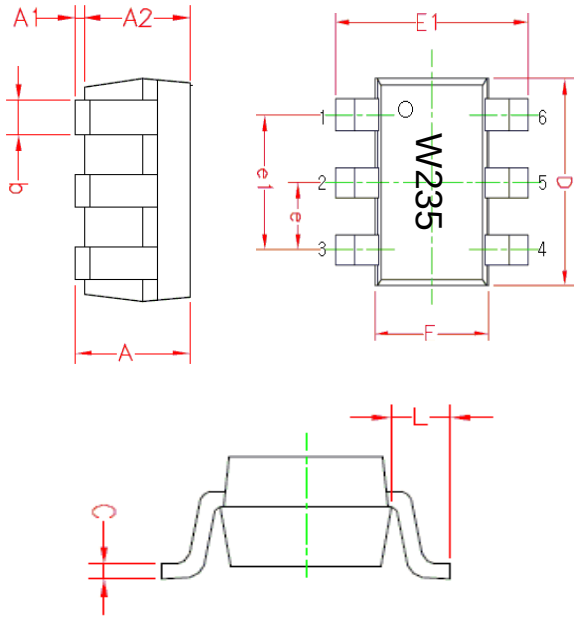
| Parameters | Rating |
|---|---|
| Operating Case Temperature | -40 to +85 °C |
| Storage Temperature | -40 to +150 °C |
| Device Voltage | +5.5 V |
| Operating Junction Temperature | +150 °C |
| Input RF Power (Continuous) | 22 dBm |

* Please find the max. input power data from http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf

## Pin Configuration

| Pin No. | Function |
|---|---|
| 1 | RF OUT & Bias |
| 2,3,5,6 | GND |
| 4 | RF IN |

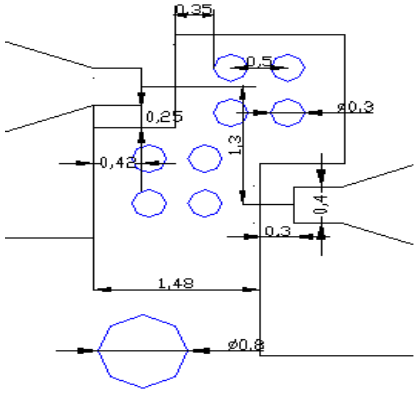
## Outline Drawing




| Symbols | Dimensions (In mm) | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.900 | 1.000 | 1.10 |
| A1 | 0.025 | 0.062 | 0.10 |
| A2 | 0.875 | 0.937 | 1.00 |
| b | 0.200 | 0.300 | 0.40 |
| C | 0.100 | 0.125 | 0.15 |
| D | 1.900 | 2.000 | 2.10 |
| F | 1.150 | 1.250 | 1.35 |
| E1 | 2.000 | 2.100 | 2.20 |
| e | -- | 0.65BSC | -- |
| e1 | -- | 1.30BSC | -- |
| L | -- | 0.425REF | -- |

| Pin NO. | Function | Pin NO. | Function. |
|---|---|---|---|
| 1 | RF OUT & Bias | 4 | RF IN |
| 2 | GND | 5 | GND |
| 3 | GND | 6 | GND |

## Mounting Recommendation




**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 lead pin 2 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 |
| | Voltage Level: 400 V |
| MM | Class A |
| | Voltage Level: 50 V |

CAUTION: ESD-sensitive device!

### Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

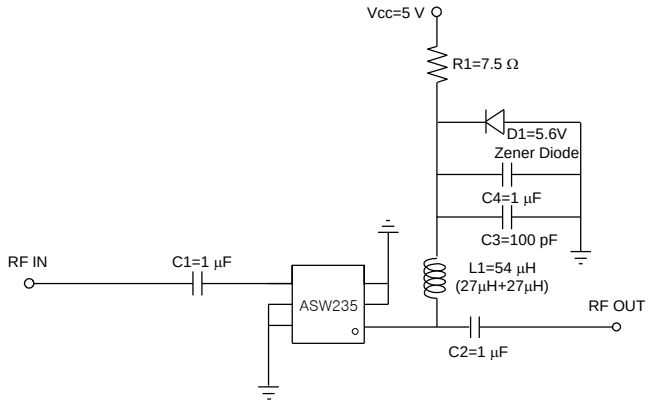
## APPLICATION CIRCUIT

| IF |
|---|
| 5 ~ 140 MHz |
| +5 V |

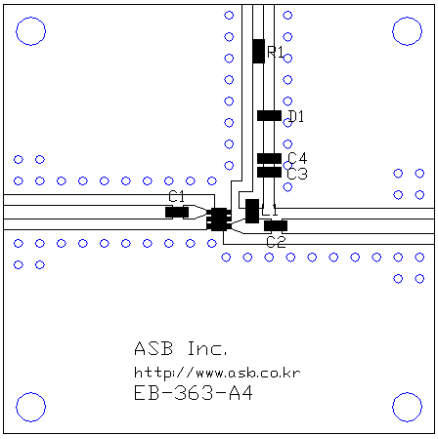
| Frequency (MHz) | 5 | 140 |
|---|---|---|
| Magnitude S21 (dB) | 24.5 | 24.5 |
| Magnitude S11 (dB) | -17 | -17 |
| Magnitude S22 (dB) | -8 | -8 |
| Output P1dB (dBm) | 14 | 14 |
| Output IP3[1)] (dBm) | 25.5 | 25.5 |
| Noise Figure (dB) | 3.3 | 3.3 |
| Device Voltage (V) | +4.65 | +4.65 |
| Current (mA) | 46 | 46 |

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

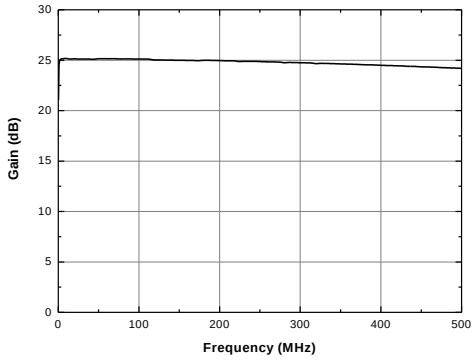
### Schematic

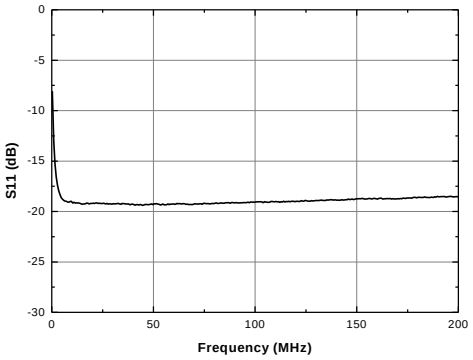


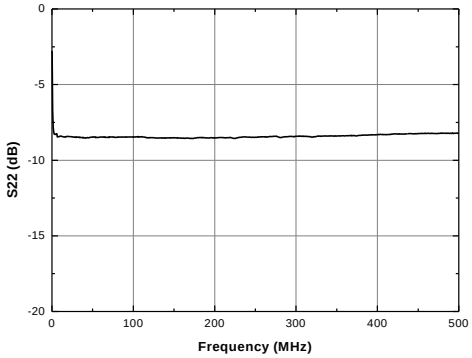

### Board Layout (FR4, 40x40 mm², 0.8T)

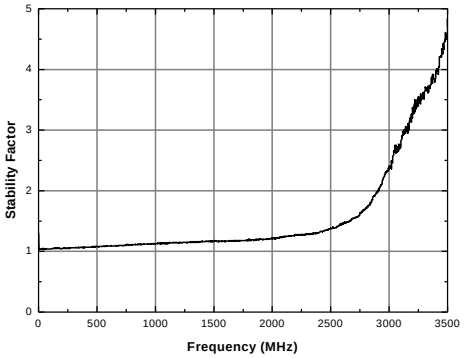



### S-parameters & K-factor



## APPLICATION CIRCUIT

**Wide Band**

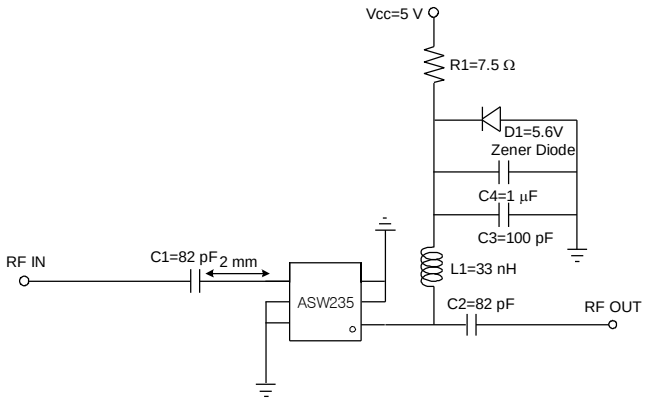
**500 ~ 2700 MHz**

**+5 V**

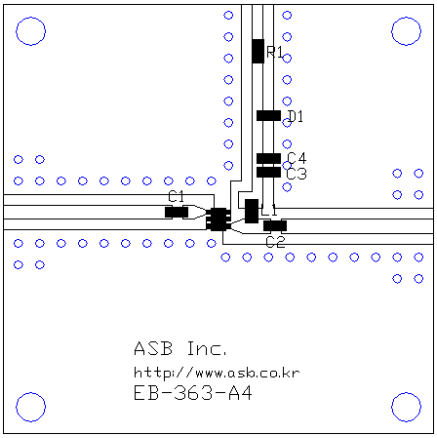
| Frequency (MHz) | 900 | 2000 | 2700 |
|---|---|---|---|
| Magnitude S21 (dB) | 23.0 | 19.5 | 17.5 |
| Magnitude S11 (dB) | -13 | -15 | -18 |
| Magnitude S22 (dB) | -10 | -12 | -12 |
| Output P1dB (dBm) | 16 | 18 | 17 |
| Output IP3[1)] (dBm) | 29.0 | 30.5 | 30.0 |
| Noise Figure (dB) | 3.3 | 3.5 | 3.9 |
| Device Voltage (V) | +4.65 | +4.65 | +4.65 |
| Current (mA) | 46 | 46 | 46 |

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

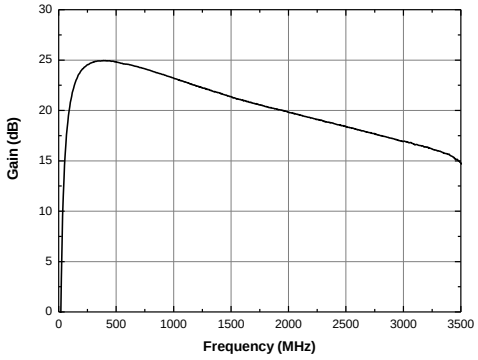
### Schematic

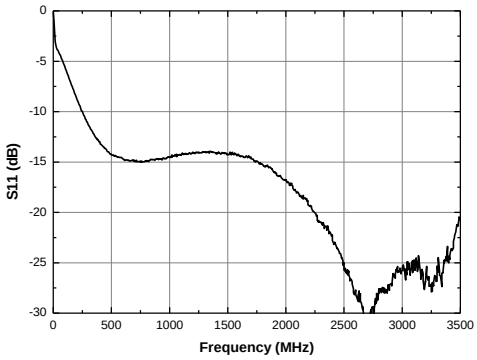


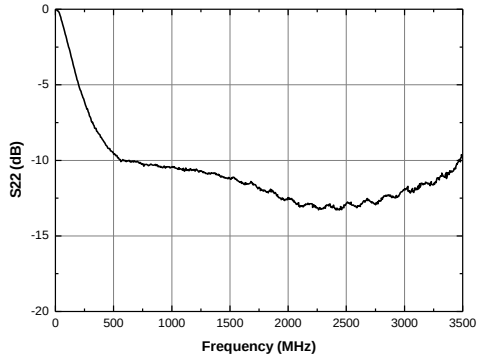

### Board Layout (FR4, 40x40 mm², 0.8T)

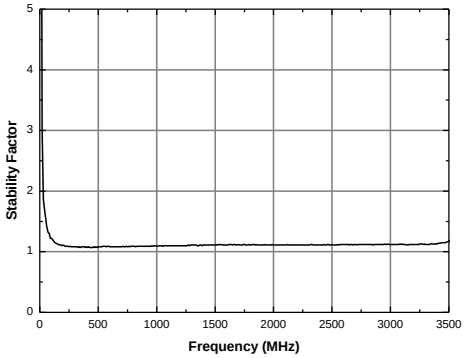



### S-parameters & K-factor



## APPLICATION CIRCUIT

**Wide Band**

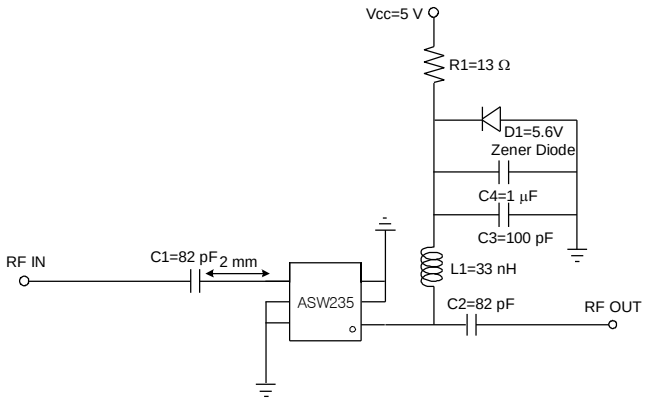
**500 ~ 2700 MHz**

**+5 V, 36 mA**

| Frequency (MHz) | 900 | 2000 | 2700 |
|---|---|---|---|
| Magnitude S21 (dB) | 22.5 | 19.0 | 17.0 |
| Magnitude S11 (dB) | -13 | -15 | -18 |
| Magnitude S22 (dB) | -9 | -12 | -11 |
| Output P1dB (dBm) | 13 | 16 | 16 |
| Output IP3[1)] (dBm) | 25.5 | 28.0 | 29.0 |
| Noise Figure (dB) | 3.2 | 3.4 | 3.8 |
| Device Voltage (V) | +4.3 | +4.3 | +4.3 |
| Current (mA) | 36 | 36 | 36 |

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

### Schematic

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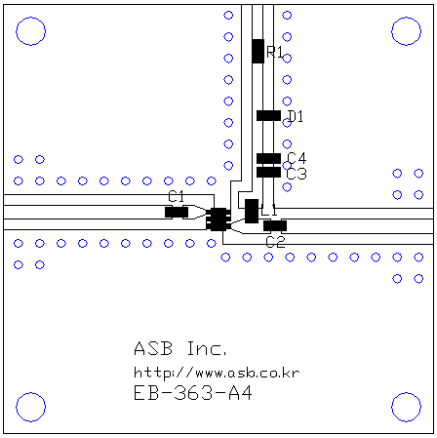
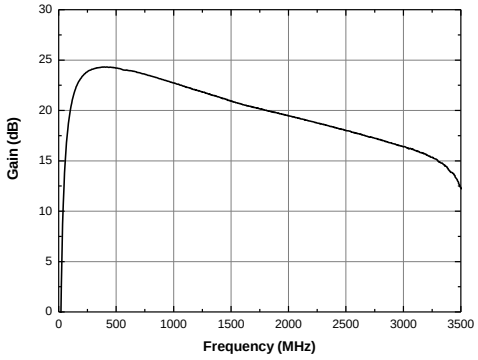
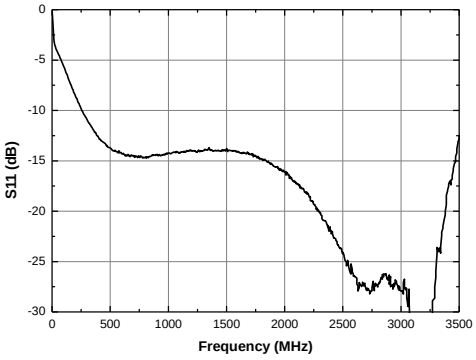
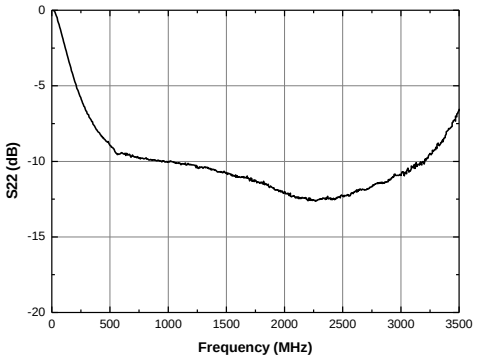
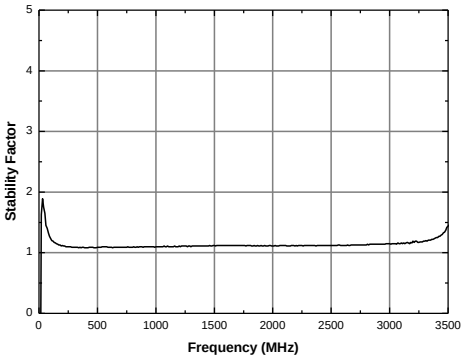



### S-parameters & K-factor



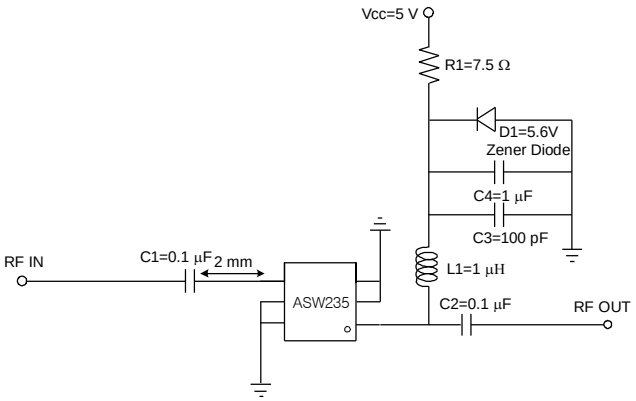
## APPLICATION CIRCUIT

| IF |
|---|
| 50 ~ 450 MHz |
| +5 V |

| Frequency (MHz) | 70 | 150 | 300 |
|---|---|---|---|
| Magnitude S21 (dB) | 24 | 24 | 24 |
| Magnitude S11 (dB) | -12 | -12 | -12 |
| Magnitude S22 (dB) | -8 | -8 | -8 |
| Output P1dB (dBm) | 15 | 15 | 16 |
| Output IP3[1)] (dBm) | 27 | 28 | 29 |
| Noise Figure (dB) | 3.3 | 3.3 | 3.4 |
| Device Voltage (V) | +4.65 | +4.65 | +4.65 |
| Current (mA) | 46 | 46 | 46 |

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

### Schematic

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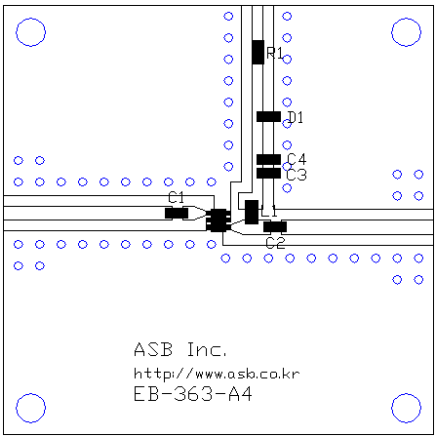


### S-parameters & K-factor