# AP1110

## 2.4~2.5 GHz Power Amplifier

**2005.02.01 Preliminary**

## DESCRIPTION

**AP1110** is a linear, low current power amplifier in ISM band utilizing InGaP /GaAs HBT process. The AP1110 is well suitable to be used for portable, low current 2.4GHz WLAN applications as well as for BT (Bluetooth) Class1 applications.
AP1110 is packaged in ***2x2*** compact profile. For WLAN application, it features low current of ***85mA*** at linear power of ***18.5dBm***, gain of 26dB under 3.3V. For Bluetooth applications, it features of gain at 26 dB; typical power of ***23dBm*** and PAE of ***40%*** under 3.3V.

### Major Applications

- Bluetooth Class 1
- IEEE 802.11b/g WLAN system
- WLAN Portable Devices
- WLAN USB Devices
- Other 2.4 GHz ISM Band

## KEY FEATURES

### WLAN Applications:

**(Under Vc=3.3V, Vref=2.8V)**

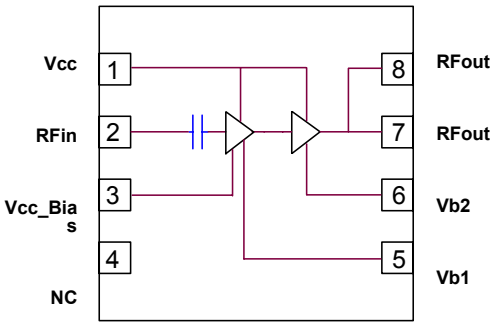
- **LOW Current: 85mA at 18.5dBm**
- **Ultra Small Profile: 2x2(mm), DFN-8pin**
- **High efficiency:**
  **PAE: 25% at 18dBm**
- **Gain: 26 dB**

### BT Applications:

**(Under Vc=3.3V, Vref=2.85V)**

- **LOW Current: 140mA at 23dBm**
  **95mA at 20dBm**
  **50mA at 14dBm**
- **Ultra Small Profile: 2x2(mm), DFN-8pin**
- **High efficiency:**
  **PAE: 40% at 23dBm**
- **Gain: 26 dB**
- **Harmonic: -33dBc at 23dBm**

### Functional Block Diagram




DFN - 8 pin, 2 x 2 (mm)

### Pin Details

| Pin Number | Name | Description |
|---|---|---|
| 1 | Vcc | Power Supply Input. |
| 2 | RFin | RF input. |
| 3 | Vcc_Bias | Supply voltage for bias circuit. |
| 4 | NC | Non-connect. |
| 5 | $V_{b1}$ | 1st-stage control voltage |
| 6 | $V_{b2}$ | 2nd-stage control voltage |
| 7 | RFout | RF output. Require external matching. The detail configuration can be found in Application Notes |
| 8 | RFout | |
| Package Base | Center Metal | The package ground provides circuit ground as well as heat dissipation path for the power amplifier. |

◎ Outside circuit for WLAN and BT application, please refer to the AP1110 Application note for different BT application usage

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## Electrical Characteristics: WLAN Applications

Under Vc=3.3V, Vref=2.8V, Ta=25ºC

| PARAMETERS | CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| **Freq.** | | f | 2.4 | | 2.5 | GHz |
| **Total current** | Pout=18.5dBm | Icc | | 85 | | mA |
| **Basic control reference current** | Icq=21mA | Iref | | 0.5 | | mA |
| **Power Gain** | Pout=18dBm | Gp | | 26.5 | | dB |
| **Quiescent current** | | Icq | | 21 | | mA |
| **Input VSWR** | | | | 1.5 | | |
| **Output VSWR** | | | | 2 | | |
| **Output power** | EVM 3% | Pout | | 18.5 | | dBm |
| **PAE** | | PAE | | 25 | | % |

## Absolute Maximum Ratings

**Note:**

| *Parameter* | *Rating* | *Unit* |
|---|---|---|
| DC Power Supply For Collector | +5 | V |
| DC Supply Current For Collector | 280 | mA |
| RF Input Power | +5 | dBm |
| Operating Ambient Temperature | -40 to +85 | ˚C |
| Storage Temperature | -40 to +125 | ˚C |

## Important

The information provided in this datasheet is deemed to be accurate and reliable only at present time. RFIC Technology Corp. reserves the right to make any changes to the specifications in this datasheet without prior notice.



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## Electrical Characteristics: BT Applications

Under Vc=3.3V, Vref=2.85V, Ta=25°C

| PARAMETERS | CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| **Freq.** | | f | 2.4 | | 2.5 | GHz |
| **Total current** | Pout=23dBm | Icc | | 140 | | mA |
| | Pout=20dBm | Icc | | 95 | | mA |
| | Pout=14dBm | Icc | | 50 | | mA |
| **Basic control reference current** | Icq=18mA | Iref | | 0.5 | | mA |
| **Power Gain** | Pout=20dBm | Gp | | 26 | | dB |
| **Quiescent current** | | Icq | | 18 | | mA |
| **Harmonic** | Pout=23dBm | 2f | | -33 | | dBc |
| **Input VSWR** | | | | 2 | | |
| **Output VSWR** | | | | 2.5 | | |
| **PAE** | Pout=23dBm | PAE | | 40 | | % |
| **Power** | | P1dB | | 23 | | dBm |

## Absolute Maximum Ratings

| ***Parameter*** | ***Rating*** | ***Unit*** |
|---|---|---|
| DC Power Supply For Collector | +5 | V |
| DC Supply Current For Collector | 280 | mA |
| RF Input Power | +5 | dBm |
| Operating Ambient Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +125 | °C |

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## Data Charts: WLAN Applications

Fig.1 – Pin, PAE and Icc vs. Pout

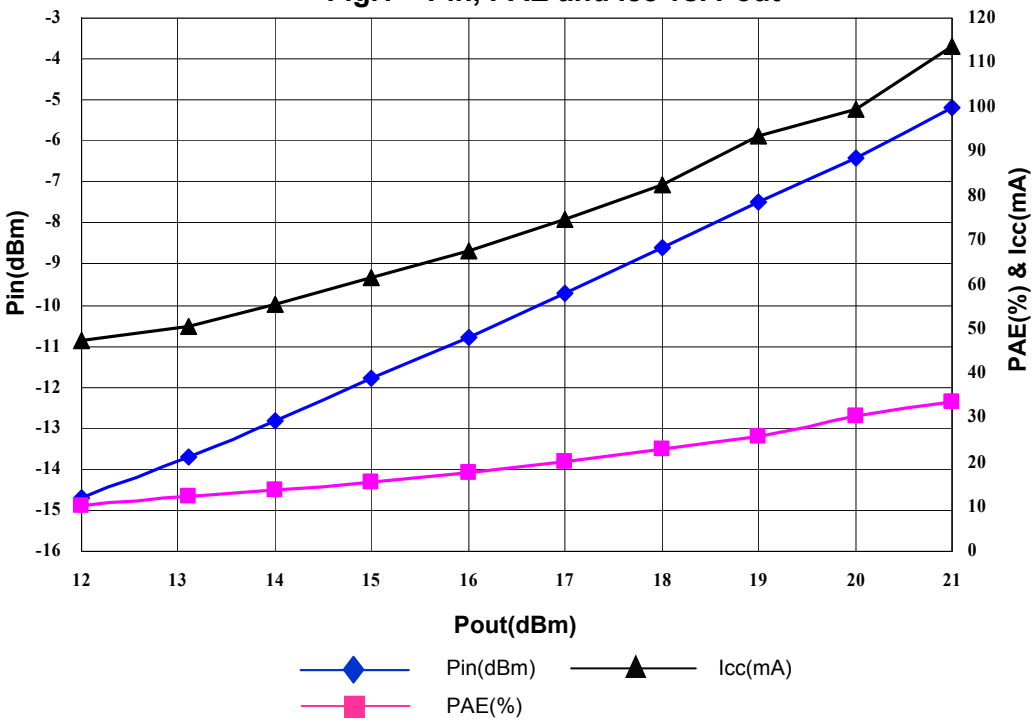
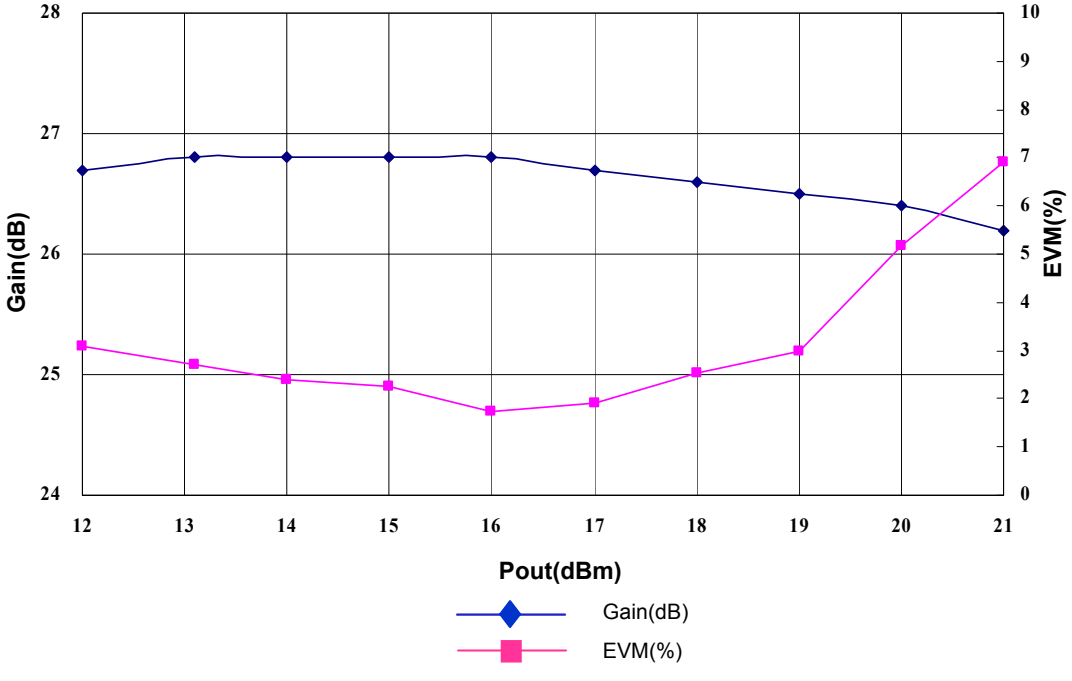



Fig.2 - Power Gain and EVM vs. Pout



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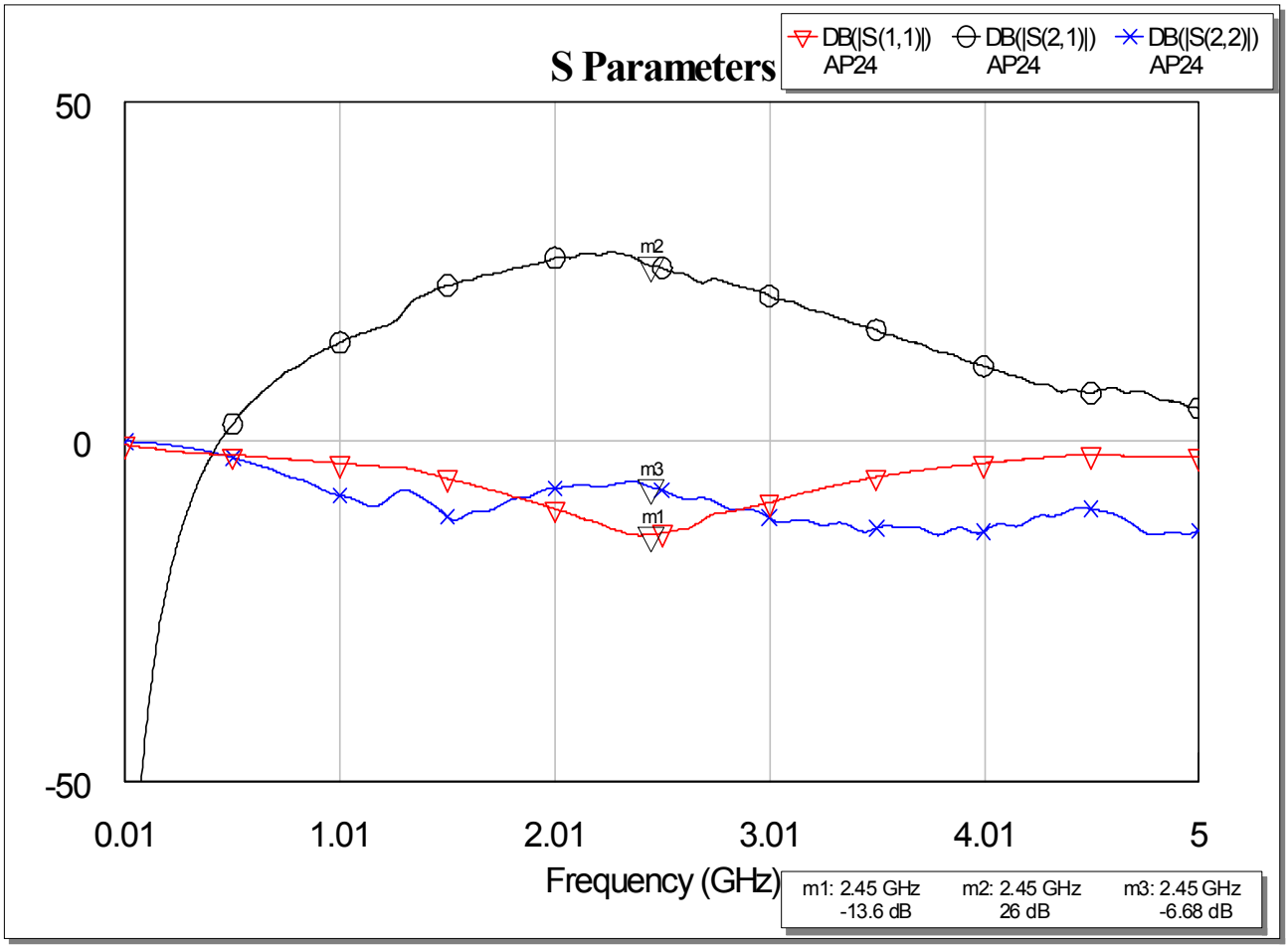
## Data Charts: WLAN Applications

**Fig.3 – S Parameters**



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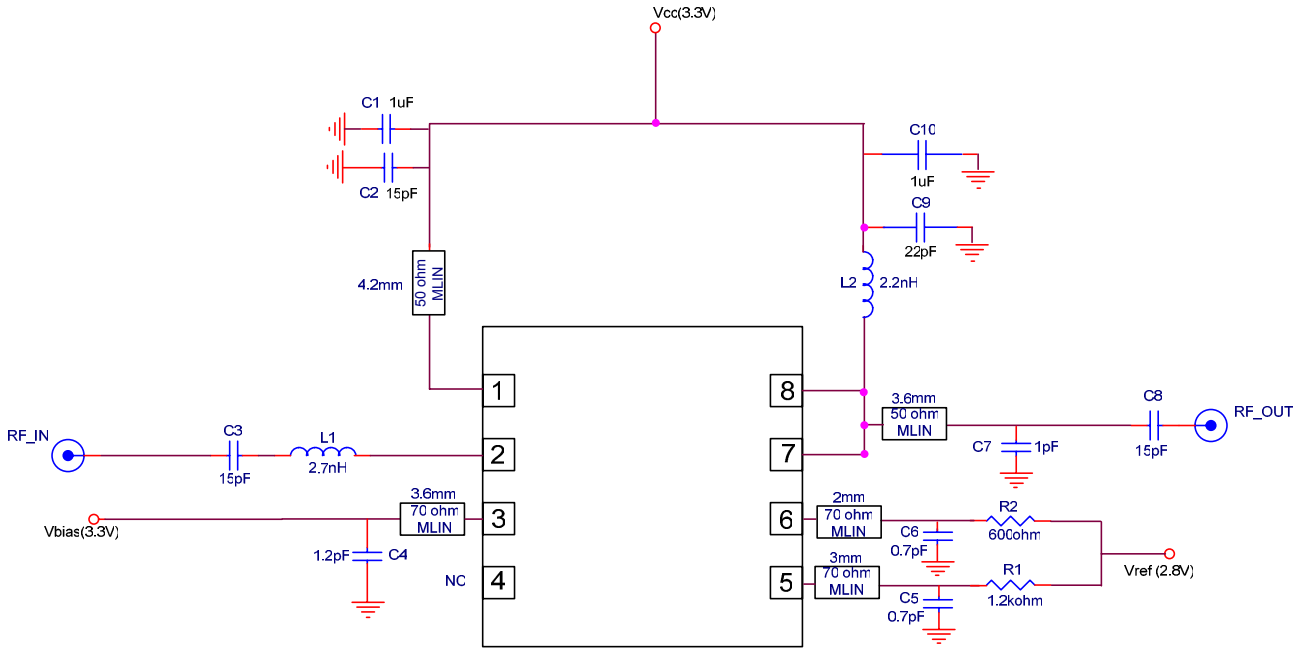
## EVB Circuit Diagram: WLAN Applications



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## Data Charts: BT Applications

**Fig.4**

**Pin & Icc vs. Pout**

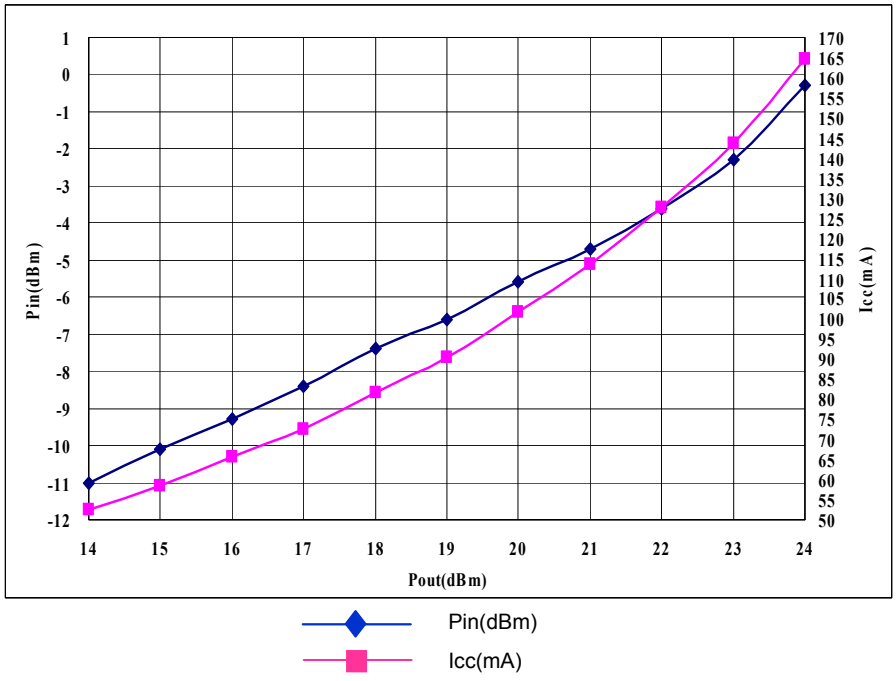
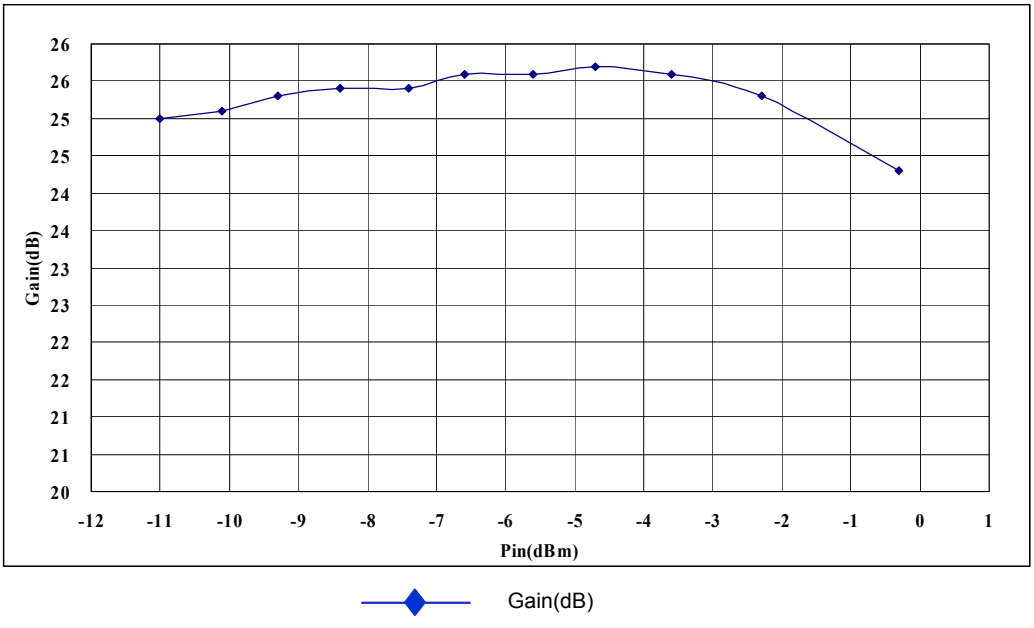



**Fig.5**

**Power Gain vs. Pin**



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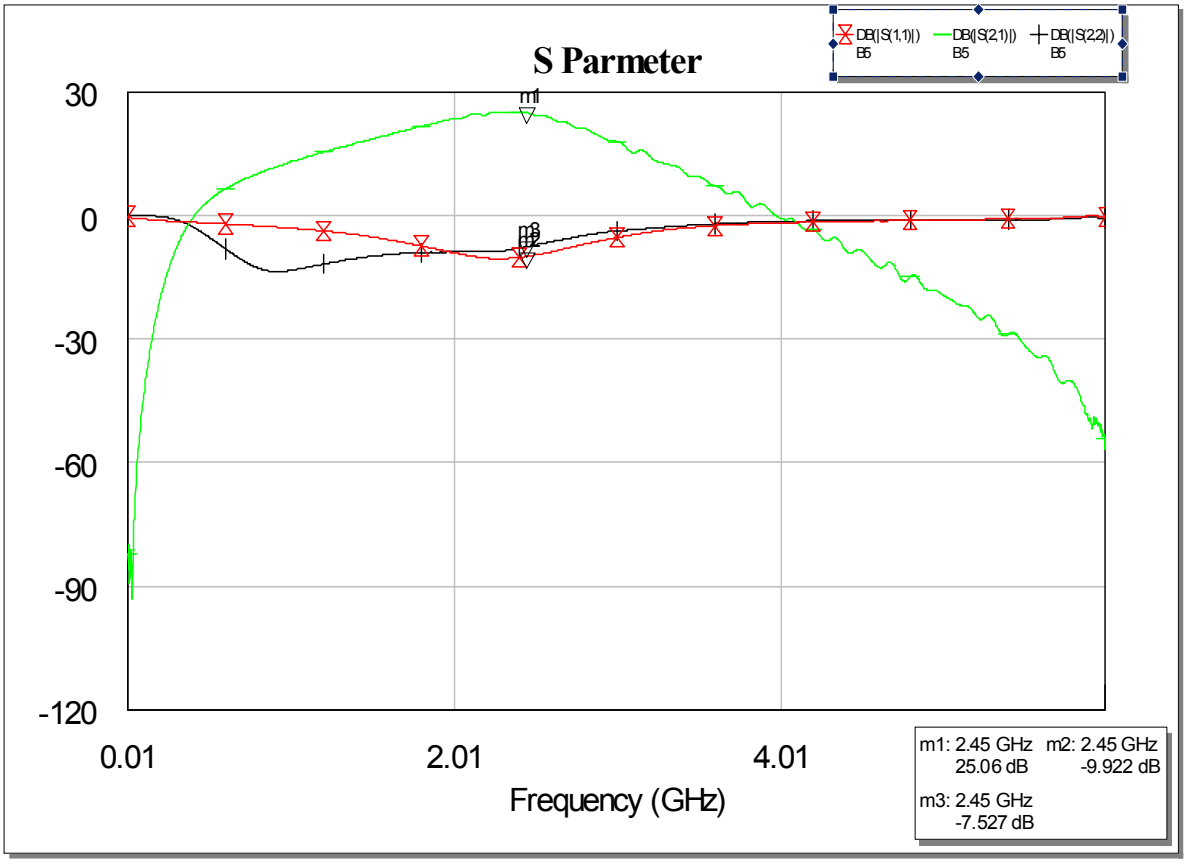
## Data Charts: BT Applications

**Fig.6**

**S Parameters**



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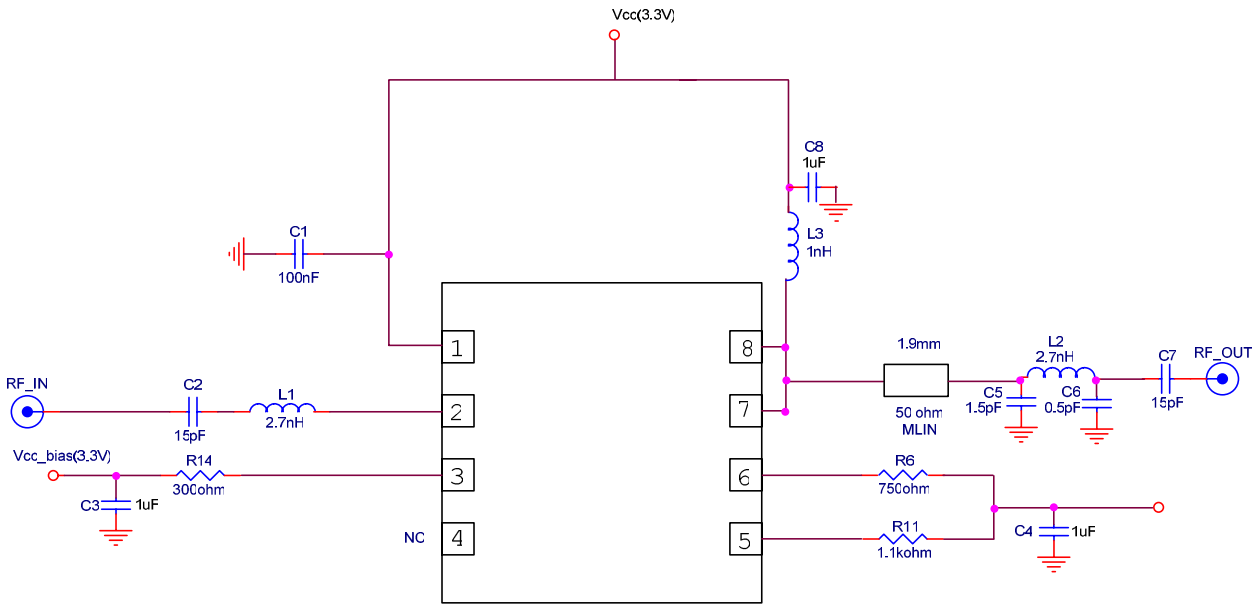
## EVB Circuit Diagram: BT Applications



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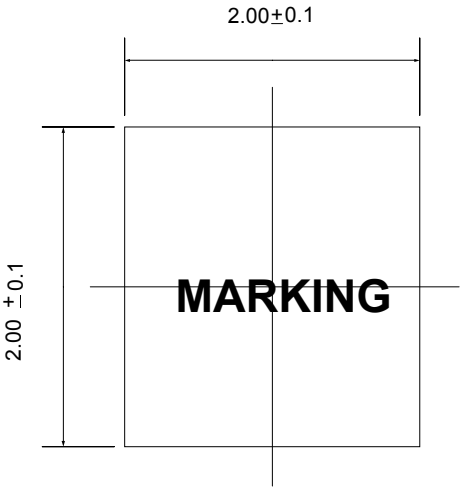
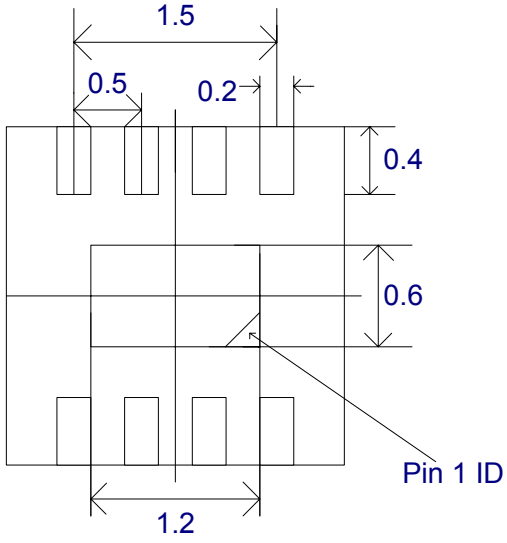
## Package Outline

### Top View

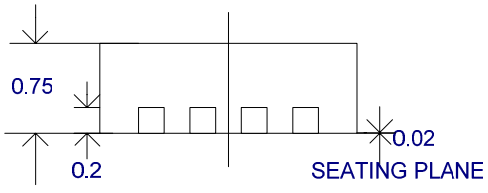



### Bottom View




Unit: mm

### Side View




Note：

1. Dimension and tolerance conform to ASME Y14.5M-1994.
2. Refer to JEDEC STD. MO-220 WEED-2 ISSUE B



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