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### 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. AP1110 is also suitable for the new BT 2.0 (EDR) standard.

### Major Applications

- Bluetooth Class 1 including V1.1,1.2 & (2.0)EDR standard
- IEEE 802.11b/g WLAN system
- WLAN Portable Devices
- WLAN USB Devices
- Other 2.4 GHz ISM Band

### KEY FEATURES

Ultra Small Profile: 2x2(mm), DFN-8pin

#### WLAN Applications:

(Under  $V_c=3.3V$ ,  $V_{ref}=2.8V$ )

- LOW Current: 85mA at 18.5dBm
- High efficiency: PAE: 25% at 18dBm
- Gain: 26 dB

#### BT Applications:

(BT V.1.1&1.2, Under  $V_c=3.3V$ ,  $V_{ref}=2.85V$ )

- LOW Current: 85mA at 18dBm  
60mA at 16dBm  
50mA at 14dBm
- High efficiency: PAE: 40% at 23dBm
- Gain: 26 dB
- Harmonic: -33dBc at 23dBm

(BT EDR version, under  $V_c \& V_{ref}=3.3V$ )

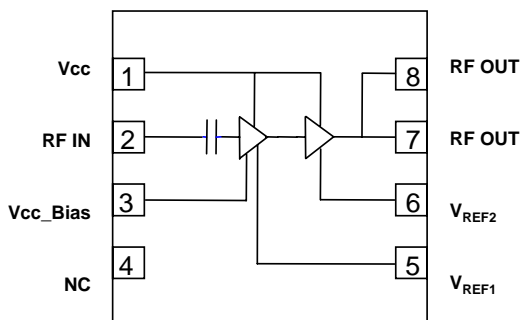
- LOW Current: 110mA at 18dBm  
95mA at 16dBm  
75mA at 14dBm
- Gain: 23dB

*Note: The different applications are based on different outside circuit, please refer to the Application Note for more details.*

### Pin Details

Pin Number	Name	Description
1	Vcc	Supply voltage.
2	RF IN	RF input.
3	Vcc_Bias	Supply voltage for bias circuit.
4	NC	No connection.
5	$V_{REF1}$	PA 1 <sup>st</sup> stage bias control voltage.
6	$V_{REF2}$	PA 2 <sup>nd</sup> stage bias control voltage.
7	RF OUT	RF output. Require external matching.
8	RF OUT	
Package Base	Center Metal	The package ground provides circuit ground as well as heat dissipation path for the power amplifier.

### Functional Block Diagram



DFN - 8 pin, 2 x 2 (mm)

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**Electrical Characteristics: WLAN Applications**Under  $V_c=3.3V$ ,  $V_{ref}=2.8V$ ,  $T_a=25^{\circ}C$ 

PARAMETERS	CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Freq.		f	2.4		2.5	GHz
Total current	$P_{out}=18.5dBm$	$I_{cc}$		85		mA
Basic control reference current	$I_{cq}=21mA$	$I_{ref}$		0.5		mA
Power Gain	$P_{out}=18dBm$	$G_p$		26.5		dB
Quiescent current		$I_{cq}$		21		mA
Input VSWR				1.5		
Output VSWR				2		
Output power	EVM 3%	$P_{out}$		18.5		dBm
PAE		PAE		25		%

**Note:** For high power application,  $V_{cc} = V_{bias} = 4.5 V$  is what we recommend and please make an advance contact with RFIC.

**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	$^{\circ}C$
Storage Temperature	-40 to +125	$^{\circ}C$

**Important Note:**

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.



**Caution: ESD Sensitive**  
Appropriate precaution in handling, packaging  
And testing devices must be observed.

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**Electrical Characteristics: BT Applications**BT V.1.0-1.2, under  $V_c=3.3V$ ,  $V_{ref}=2.85V$ ,  $T_a=25^{\circ}C$ 

PARAMETERS	CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Freq.		f	2.4		2.5	GHz
Total current	Pout=23dBm Pout=20dBm Pout=14dBm	Icc		140 95 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

BT v.2.0 (EDR), under  $V_c \& V_{ref}=3.3V$ ,  $T_a=25^{\circ}C$ 

PARAMETERS	CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Freq.		f	2.4		2.5	GHz
Total current	Pout=18dBm Pout=16dBm Pout=14dBm	Icc		110 95 75		mA
Power Gain	Pout=18dBm	Gp		23		dB
Harmonic	Pout=18dBm	2f		-20		dBc
PAE	Pout=18dBm	PAE		18		%

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## Data Charts: WLAN Applications

Fig.1 – Pin, PAE and Icc vs. Pout

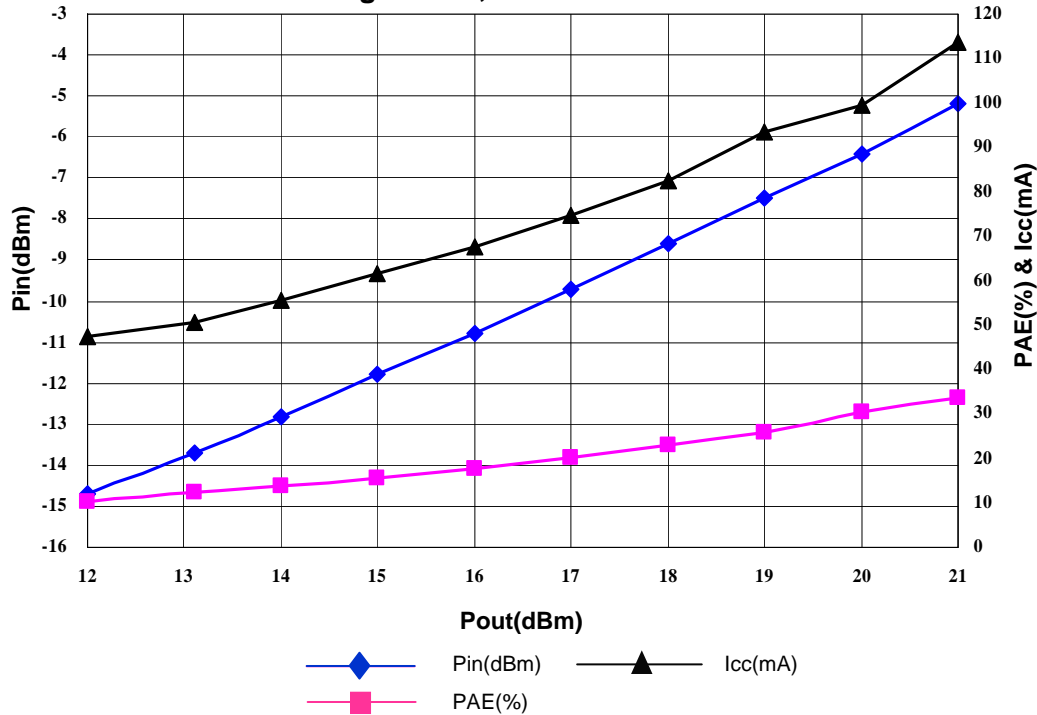
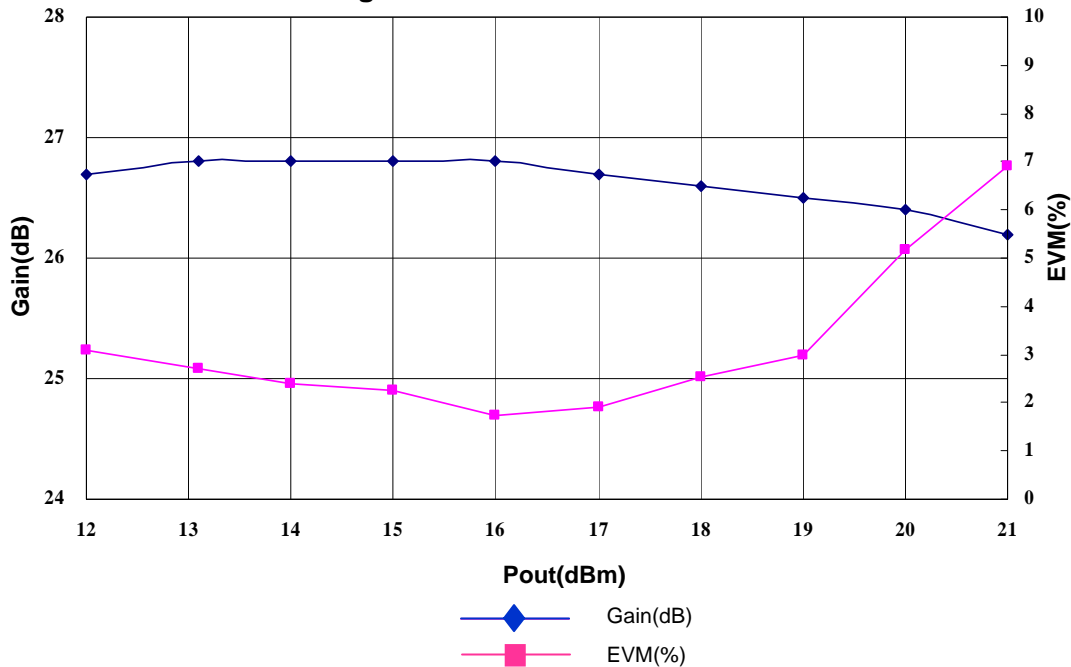


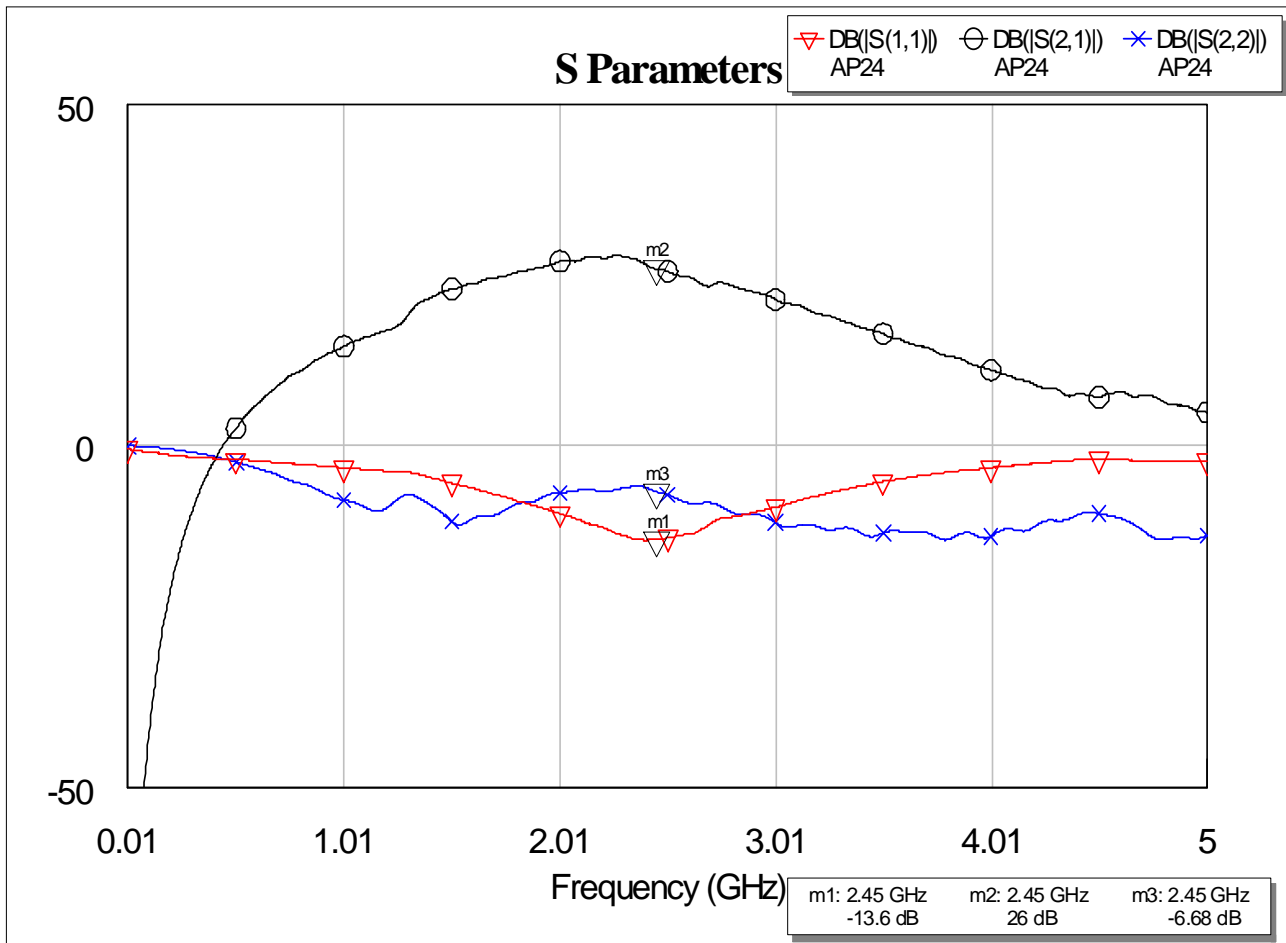
Fig.2 - Power Gain and EVM vs. Pout



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## Data Charts: WLAN Applications

Fig.3 – S Parameters



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## Data Charts: BT V1.1-1.2 Applications

Fig.4

Pin & Icc vs. Pout

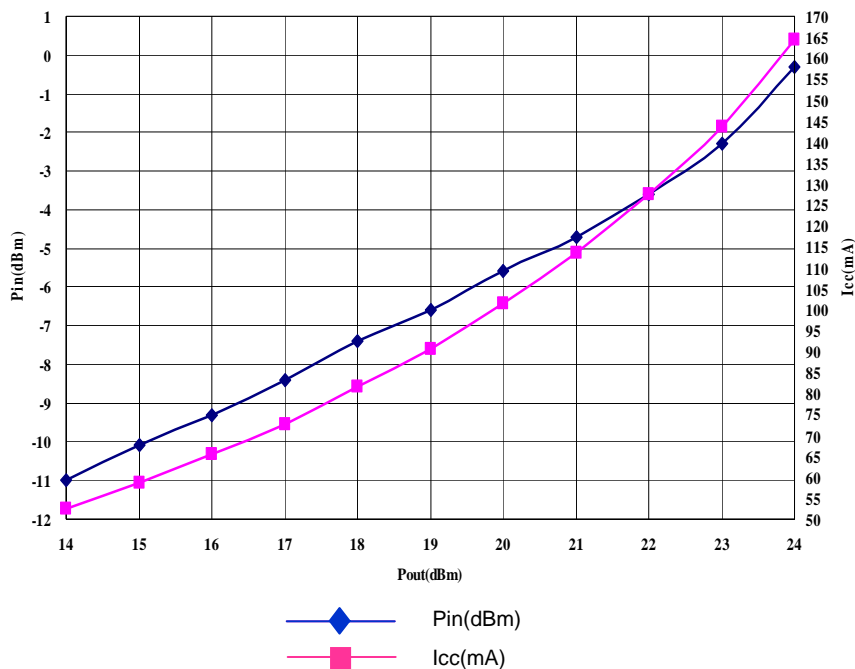
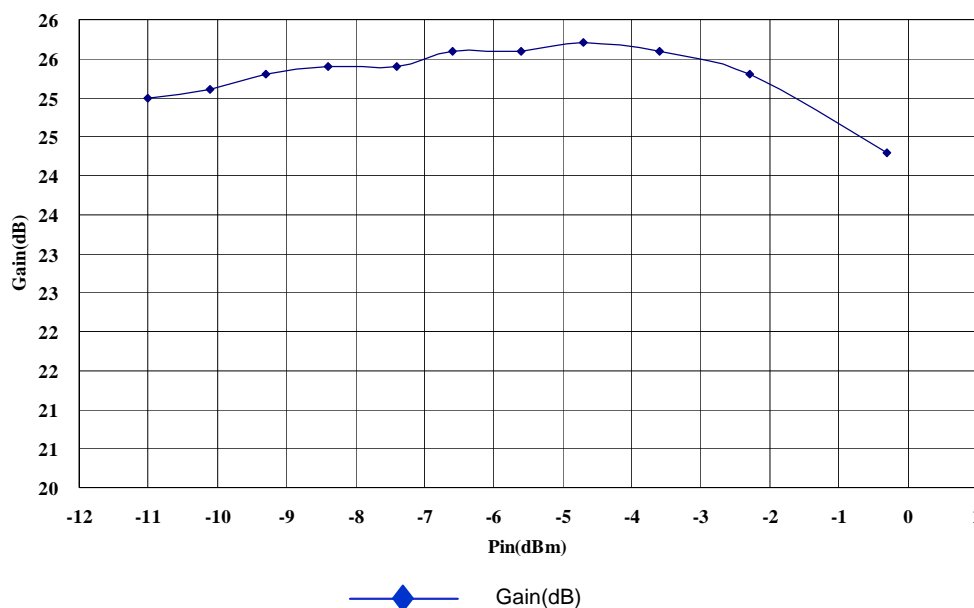


Fig.5

Power Gain vs. Pin



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## Data Charts: BT V2.0(EDR) Applications

Fig.6

Pin, PAE & Icc vs. Pout

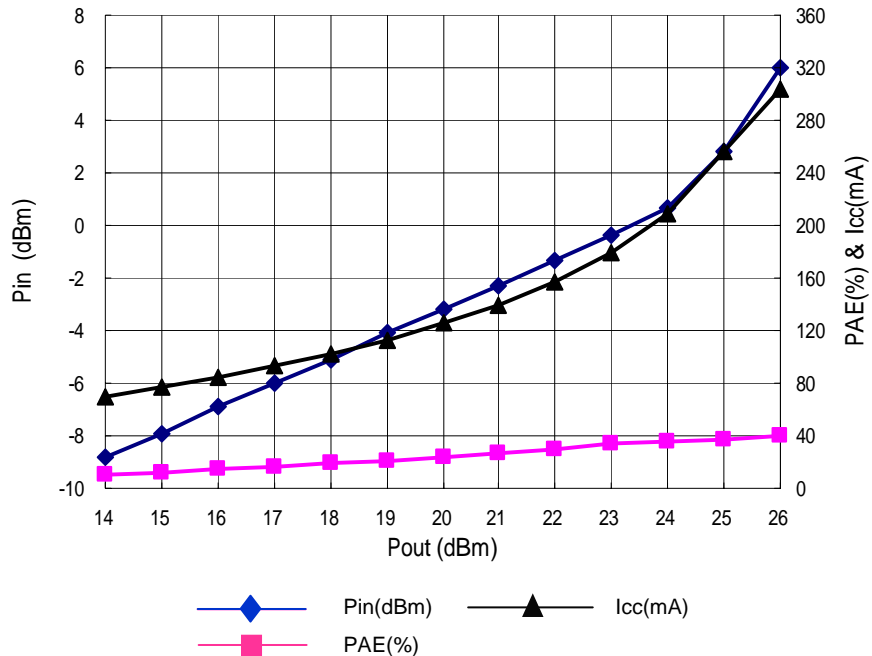
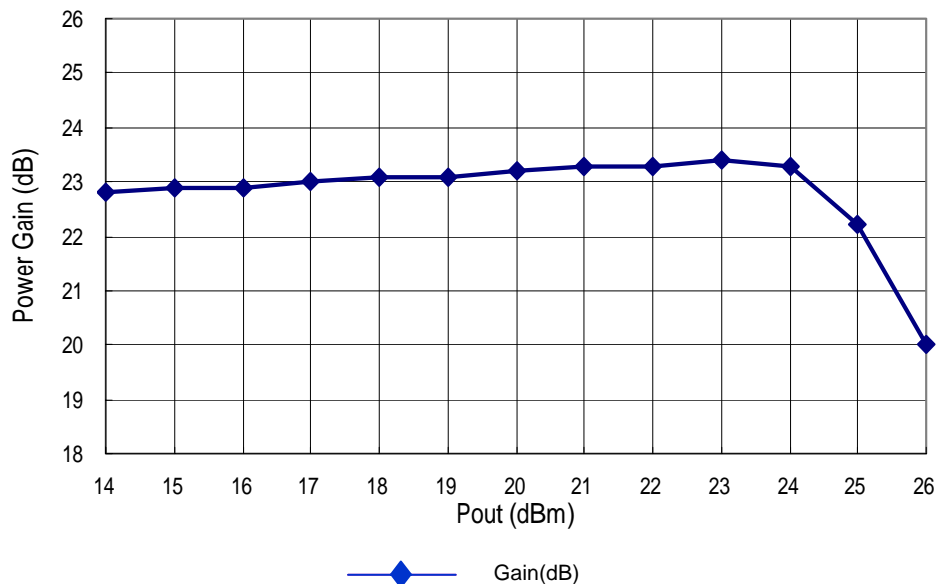


Fig.7

Power Gain vs. Pin



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## Data Charts: BT v.1.1-1.2 Applications

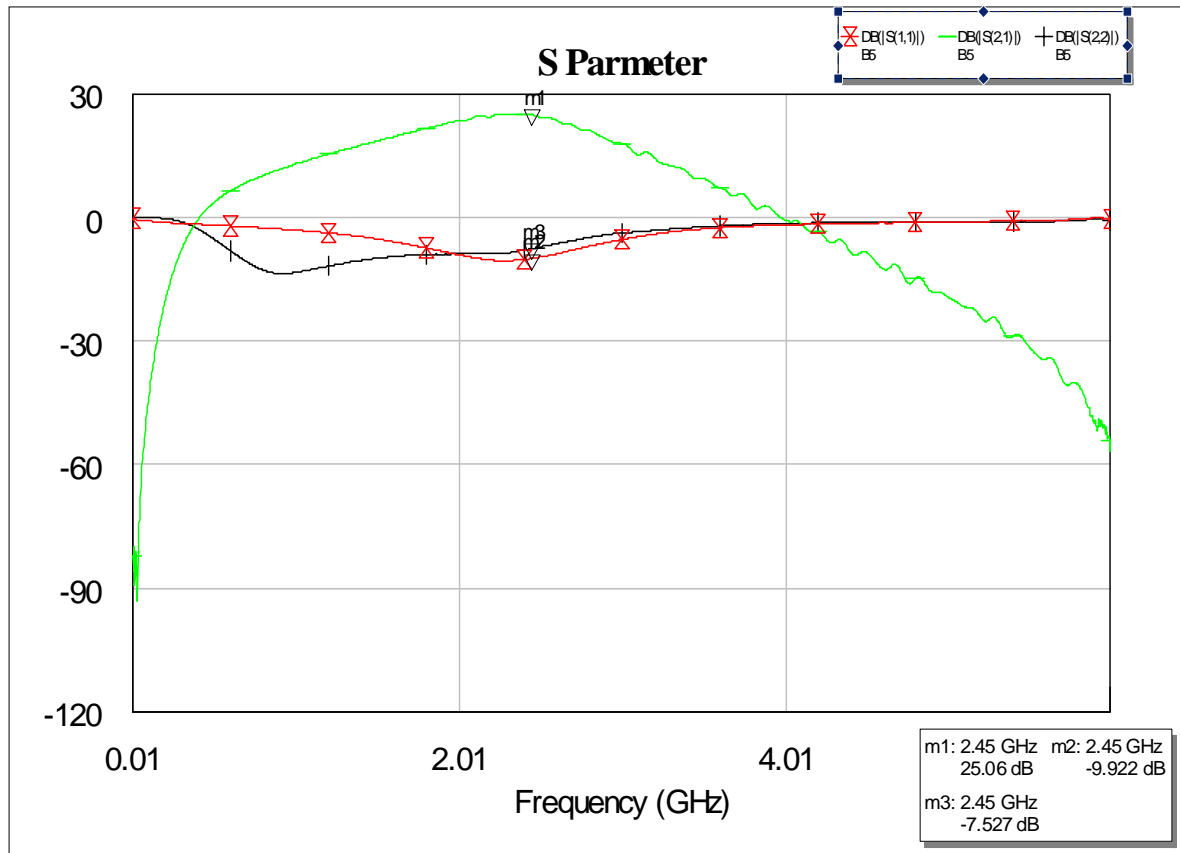


Fig.8



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## Data Charts: BT v.2.0(EDR) Applications

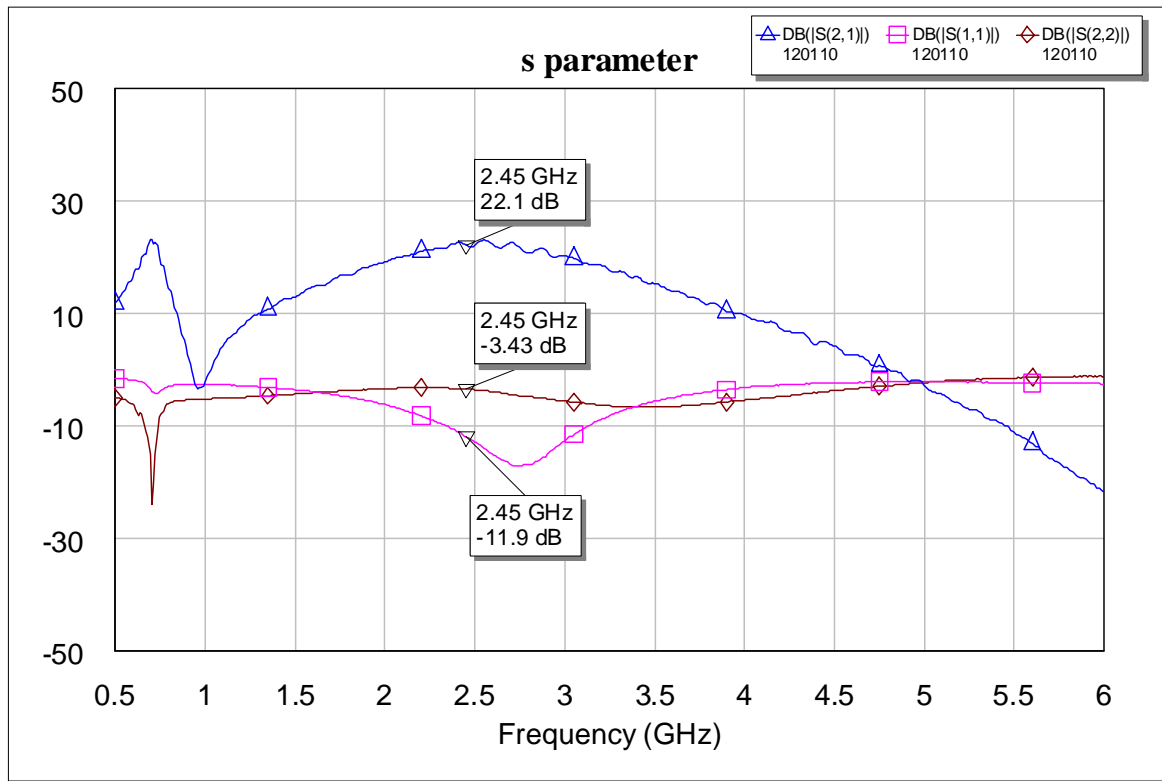
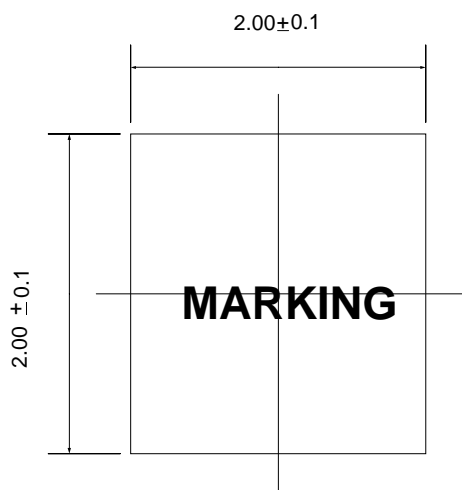


Fig.9

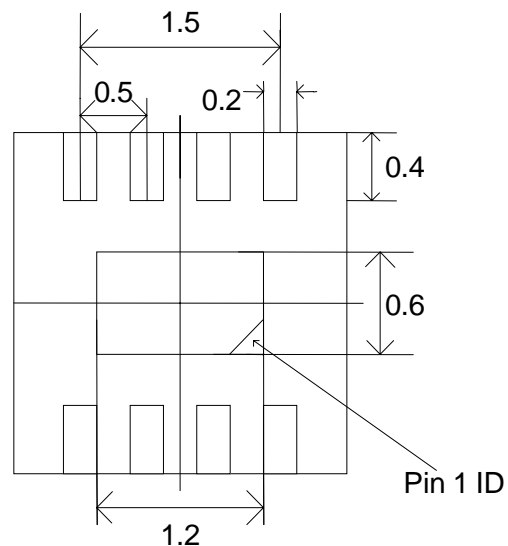
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## Package Outline

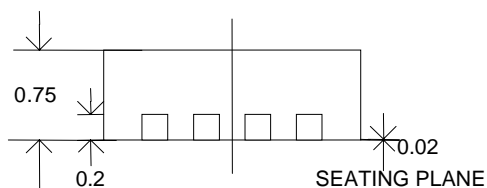
### Top View



### Bottom View



### Side View



Unit: mm

### Note :

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