
GA2P4W22

Preliminary Information

2.4-2.5 GHz Power Amplifier and Detector Module with power enable function

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Features

- Single Supply 3.3V
- Output Power..... 22.5 dBm (Typ.) at ACPR, DSSS modulated,
1st Side Lobe < -30dBc, 2nd Side Lobe < -50dBc
- Small signal Gain..... 30dB (Typ.)
- Excellent linearity.
- 50W internal input and output matching.
- Module solution with internal I/O matching, with power detection function, DC decoupled and ESD protection
- Power enable function is built-in with low current drive (less than 1uA) thru PA_E pin.
- B_ctrl pin with typical 45uA to drive.

Applications

- IEEE802.11 b Standard
- IEEE802.11 g Standard
- Wireless Local Area Networks (WLAN)
- PCMCIA Wireless Transceivers
- TDMA Packet Protocol Radios

General Description

The GA2P4W22 is a 2.4-2.5GHz hybrid InGaP/GaAs HBT Power Amplifier designed to operate in the ISM Band. It features single low voltage supply with three stages cascaded, and deliver 22.5dBm(Typ.) output power for the typical DSSS modulation signal (which conform ACPR, 1ST Side Lobe < -30dBc, 2nd Side Lobe < -50dBc). Especially, the device includes a power detector which is accurate over a wide dynamic range.

50W internal input and output matching is implemented. PA_E pin can execute power amplifier into a

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shutdown mode or enable mode. B_ctrl pin (B_ctrl=2.0V) can execute power amplifier high P1dB with reasonable current consumption(260mA). The GA2P4W22 is housed in a small size (7.75mm by 5.69 mm and low profile 1.2mm maximum) and 8 leadless encapsulated plastic land grid array (LGA) package.

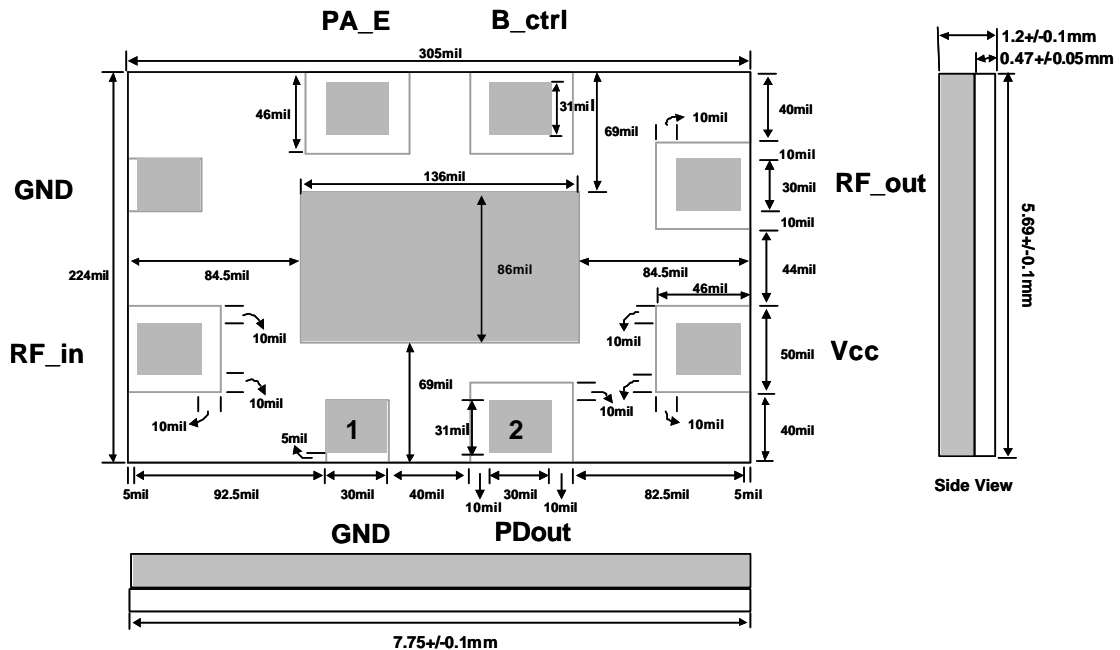


Figure 1: Footprint of the top view and side view of Gatax's GA2P4W22 power amplifier module.

Pin Descriptions

Table 1 Pin arrangement description

Pin No.	Name	Function Description
1	GND	Ground.
2	PDout	Detector Output.
3	Vcc	Power Supply.
4	RF_out	RF Output of the Power Amplifier.
5	B_ctrl	Input Control Pin to execute different mode of the Power Amplifier. Typical operation level is 2.0V.
6	PA_E	Input Control Pin to shutdown or enable Power Amplifier. Shutdown mode level typically is 0.2V. Enable mode level is from 1.6 V to 3.6V.
7	GND	Ground.
8	RF_in	RF Input of the Power Amplifier.
Center ground	Center ground	Module backside ground for electricity and thermal conductivity for heat. Solder paste should fill the whole area for good thermal conductivity.

Table 2 Recommended Operating Conditions

Item	Sym.	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}		3.3		V
Operating case temperature	T_C	-30		+85	°C

Table 3 Absolute Maximum Ratings

Item	Sym.	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}			5.5	V
Base control pin voltage	B_{ctrl}	0		3.8	V
Storage temperature	T_{STG}	-55		+125	°C
RF input Power				6	dBm

Table 4 General DC Electrical Characteristics

Item	Condition	Min.	Typ.	Max.	Units
Supply voltage	Gain variation $\leq \pm 0.5$ dB	2.8	3.3	3.8	Volt
Total Power Amplifier Supply Current at 3.3V, 20dBm Output, $B_{ctrl}=2.0$ V	$T=25^\circ\text{C}$		260		mA
B_{ctrl} voltage			2.0		Volt
B_{ctrl} tolerance	Output power < 1dB		± 0.1		Volt
B_{ctrl} drive current			45		uA
PA_E shutdown mode		0	0.2	1.3	Volt
PA_E enable mode		1.6	2.8	3.6	Volt
B_{ctrl} rising time			400		ns
B_{ctrl} falling time			100		ns
PA_E rising time			400		ns
PA_E falling time			100		ns

Table 5 Power Amplifier AC Electrical Specifications

Item	Temp.	Test Condition	Min.	Typ.	Max.	Units
RF Frequency Range	Full		2400	-	2500	MHz
Gain(S21)	25		27	30	-	dB
Gain Flatness	25	From 2400MHz to 2500MHz	-	<1	-	dB
Input return loss(S11)	25		-	-10	-	dB
Output return loss(S22)	25		-	-10	-	dB
P1dB	25	@2450MHz		24		dBm
Output Power	25	ACPR, DSSS, 1st Side Lobe < -30dBc, 2nd Side Lobe < -50dBc	-	22.5	-	dBm
Output Stability VSWR	25	Output Spurs Less than -60dBc	-	-	10:1	-

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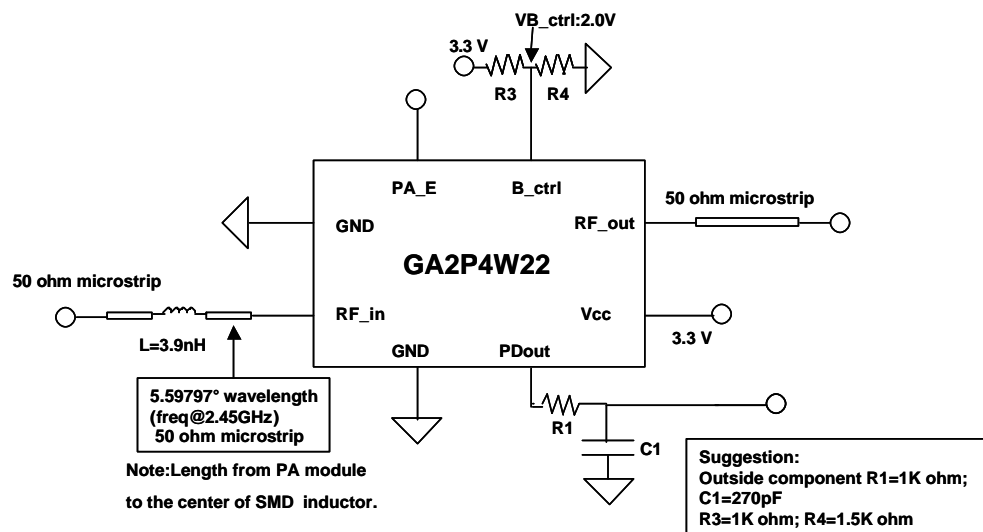
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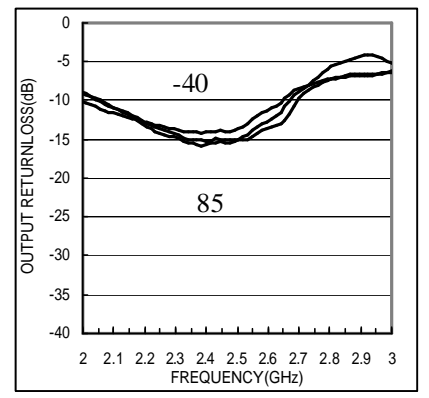
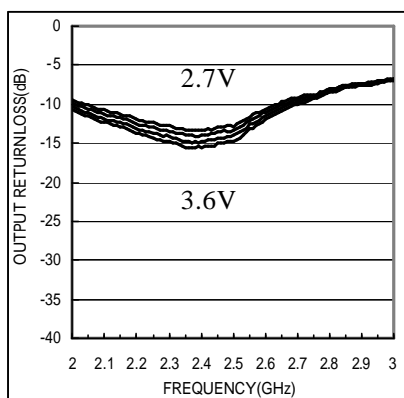
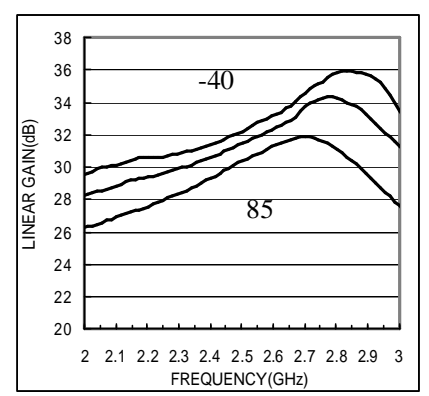
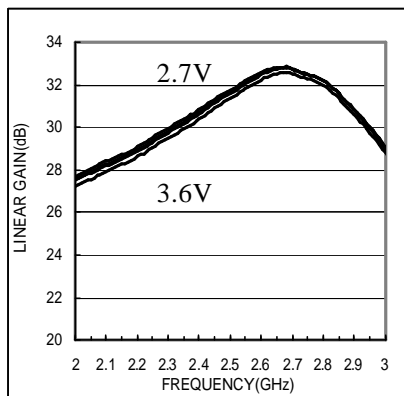
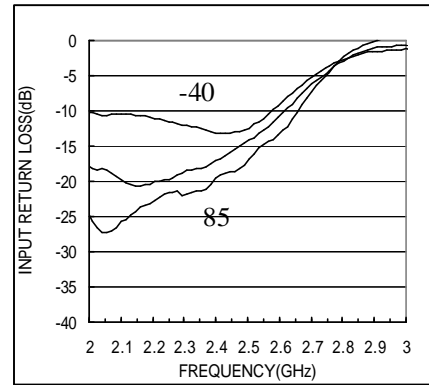
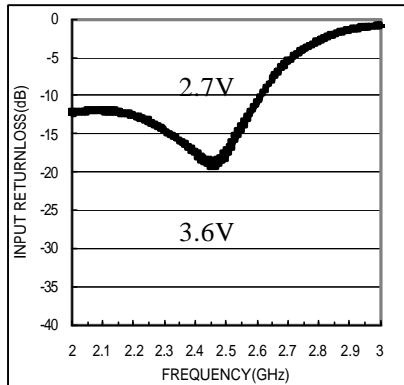
Table 6 Peak Detector AC Electrical Specifications

Item	Temp.	Test Condition	Min.	Typ.	Max.	Units
RF Output Detector Response Time	25		-	2.0	-	μs
RF Output Detector Voltage level(10dBm)	25	Load> 1MΩ Freq=2.45GHz	0	0.3	0.5	V
RF Output Detector Voltage level(20dBm)	25	Load> 1MΩ Freq=2.45GHz	0.8	1.2	2	V


Figure 2: Application diagram of GA2P4W22 module (RF decoupling capacitors are not required).

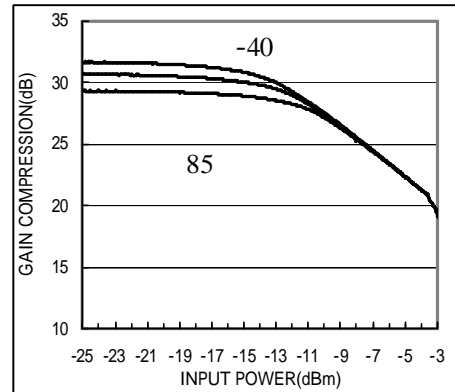
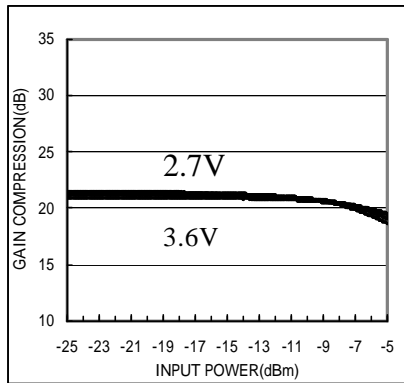
Typical Performance Curves of W22

Note: Vcc from 2.7V to 3.6V step 0.3V; Vb=2.5V; Temperature from -40°C, 25°C to 85°C



Typical Performance Curves of W22(Continued)

Note: Vcc from 2.7V to 3.6V step 0.3V; Vb=2.5V; Temperature from -40°C, 25°C to 85°C


RECOMMENDED SOLDERING CONDITIONS:

This product should be soldered under the following recommended conditions.

Package peak temperature: **221°C or below**

Time: 30 seconds or less

RECOMMENDED STORAGE CONDITIONS:

After opening the dry pack, keep it in a place below **25°C and 65%RH** for the allowable storage period.