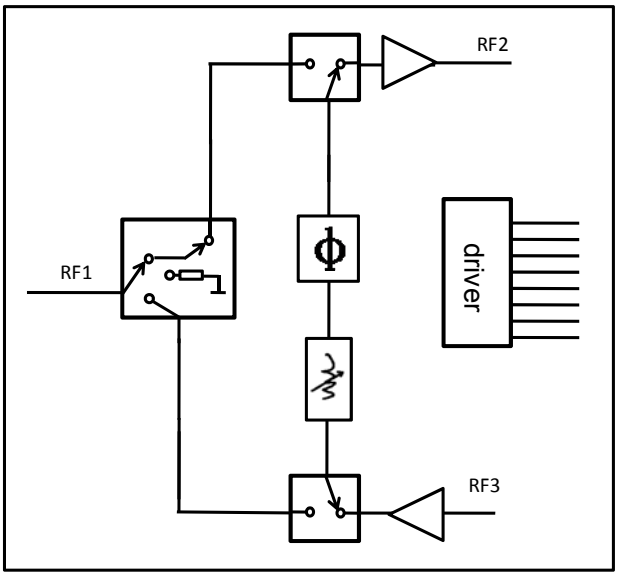
Features

Frequency: 0.4～0.5GHz
Transmit Path Linear Gain: 23dB
Receive Path Linear Gain: 11dB
Phase Shift Step: 5.625°
Phase Shift Bit: 6
RMS Phase Error: 2.5°
Attenuation Step: 0.5 dB
Attenuation Bit: 6
RMS of Attenuation Accuracy: 0.8dB
Supply Voltage: +3.3V
Supply Current: 45mA/15mA
Control Voltage: 0/-5V
Chip Size: 5mm×3.5mm×0.1mm

General Description

The HG151N is a multi-function GaAs pHEMT chip which is operating between 0.4 and 0.5 GHz. It includes an amplifier, 6-bit digital phase shifter, 6-bit digital attenuator, switch and so on.

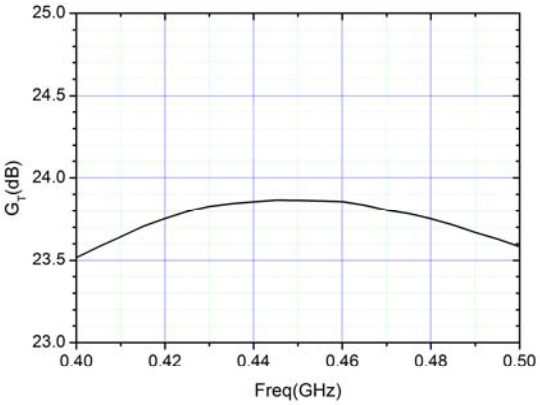
Functional Diagram



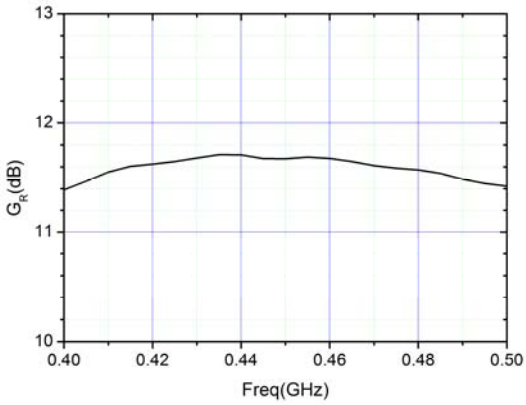
Electrical Specifications(T_A=25 ℃, Transmit Vd1=+3.3V,Vd2=0V, Receive Vd1=0V,Vd2=+3.3V)

Parameter	Symbol	Unit	Min.	Typ.	Max
Frequency (GHz)	f	GHz		0.4~0.5	
Transmit Gain	G_T	dB	—	23	—
Transmit Gain Flatness	ΔG_T	dB	—	±0.3	—
Transmit Output Power	Pout(T)	dBm	—	21	—
RGain	G_R	dB	—	11	—
Receive Gain Flatness	ΔG_R	dB	—	±0.3	—
Receive Output Power for 1dB Compression	P1dB(R)	dBm	—	2	—
RMS Phase Error	Rms_pe	°	—	2.5	—
Phase Amplitude Variation	ΔA	dB	—	±0.8	—
RMS of Attenuation Accuracy	Rms_att	dB	—	0.8	—
Attenuator Phase Variation	ΔΦ	°	—	±3	—
Input/Output VSWR	VSWR	-	—	1.6	—
Transmit/Receive Isolation	ISO	dB	—	40	—

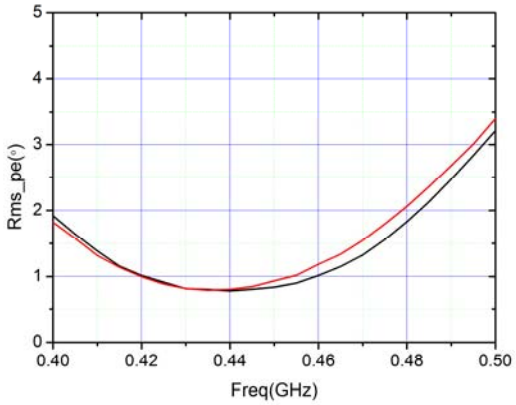
Transmit Gain



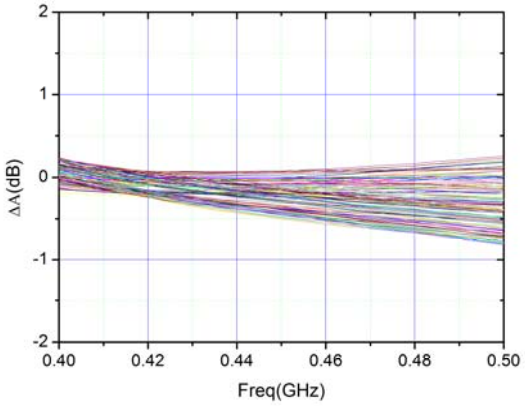
Receive Gain



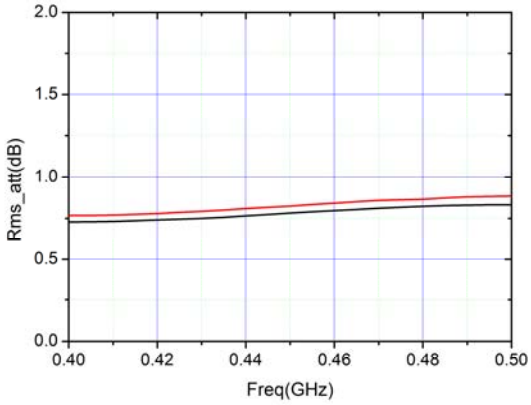
RMS Phase Error



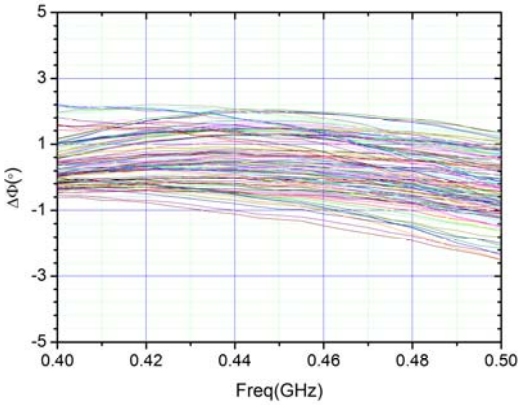
Phase Amplitude Variation



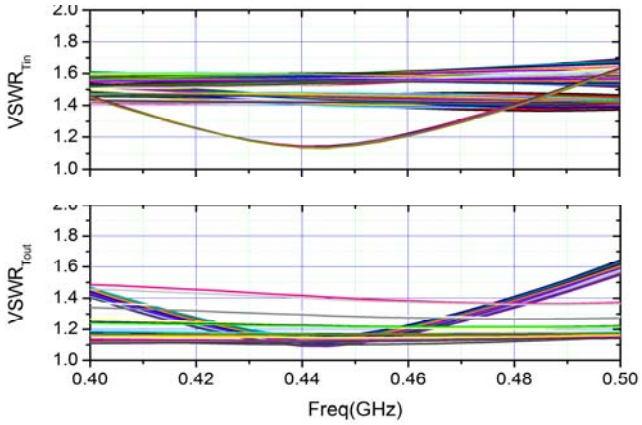
RMS Attenuation Error



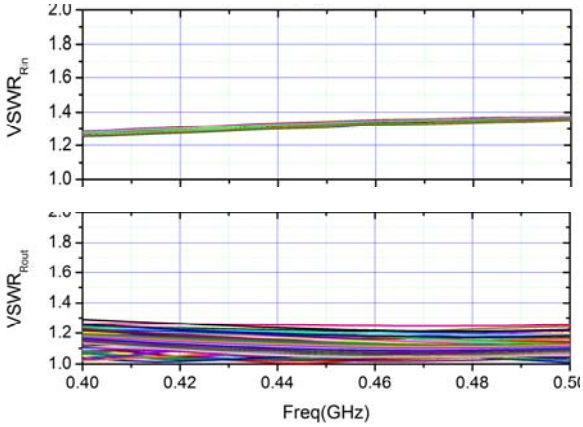
Attenuation Phase Variation



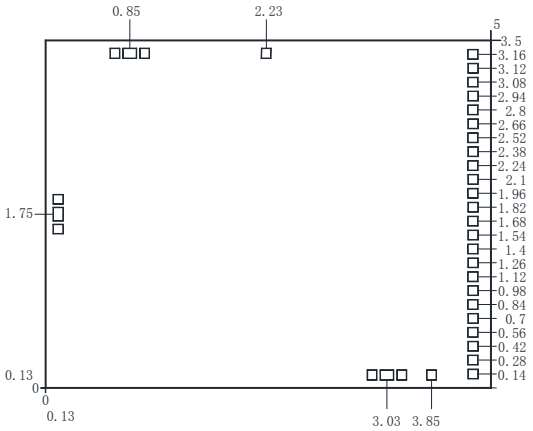
Transmit VSWR



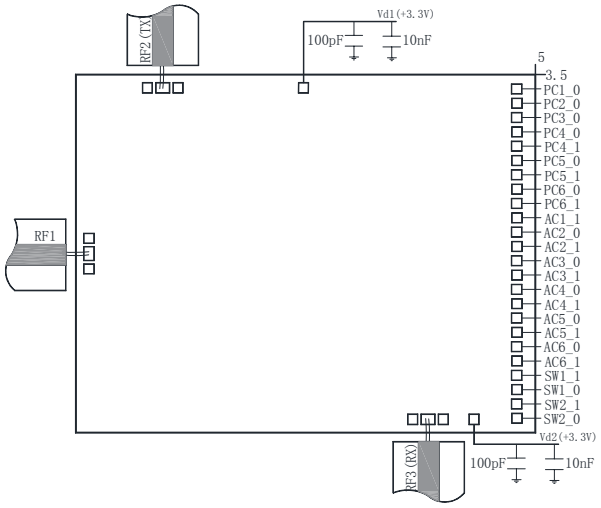
Receive VSWR



Outline Drawing (mm)



Assembly Diagram



Ports Description

RF Ports	RF1	transmit/receive share RF Port
	RF2	Transmit RF output
	RF3	Receive RF input
Voltage Supply Ports	Vd1	+3.3V(Transmit), 0V(Receive)
	Vd2	0V(Transmit), +3.3V(Receive)
Control Ports	PC1-PC6	6-bit phase control
	AC1-AC6	6-bit attenuation control
	SW1-SW2	switch control

Switch Truth Table(0：0V，1：-5V)

SW1_0	SW1_1	SW2_0	SW2_1	RF1-RF2	RF3-RF1	RF1-Load
0	1	0	1	ON	OFF	OFF
0	1	1	0	ON	OFF	OFF
1	0	1	0	OFF	ON	OFF
1	0	0	1	OFF	OFF	ON

Attenuation Truth Table(0：0V，1：-5V）

States	AC1_1	AC2_0	AC2_1	AC3_0	AC3_1	AC4_0	AC4_1	AC5_0	AC5_1	AC6_0	AC6_1
0	1	0	1	0	1	0	1	0	1	0	1
-0.5dB	0	0	1	0	1	0	1	0	1	0	1
-1dB	1	1	0	0	1	0	1	0	1	0	1
-2dB	1	0	1	1	0	0	1	0	1	0	1
-4dB	1	0	1	0	1	1	0	0	1	0	1
-8dB	1	0	1	0	1	0	1	1	0	0	1
-16dB	1	0	1	0	1	0	1	0	1	1	0
-31.5dB	0	1	0	1	0	1	0	1	0	1	0

Phase Shift Truth Table(0：0V，1：-5V)

States	PC1_0	PC2_0	PC3_0	PC4_0	PC4_1	PC5_0	PC5_1	PC6_0	PC6_1
0	0	0	0	0	1	0	1	0	1
-5.625°	1	0	0	0	1	0	1	0	1
-11.25°	0	1	0	0	1	0	1	0	1
-22.5°	0	0	1	0	1	0	1	0	1
-45°	0	0	0	1	0	0	1	0	1
-90°	0	0	0	0	1	1	0	0	1
-180°	0	0	0	0	1	0	1	1	0
-354.375°	1	1	1	1	0	1	0	1	0

Absolute Maximum Ratings

Supply Voltage	+3.6V	
RF Input Power	+20dBm	
Control Voltage	Low Level: -0.5 ~ 0V	High Level: -5 ~ -4V
Operating Temperature	-55℃～125℃	
Storage Temperature	-65℃～150℃	

Notes:

1. The chip should be stored in a dry and nitrogen environment, and used in a clean environment.
2. GaAs material is brittle, can not touch the surface of the chip, must be careful when using.
3. The chip is welding with conductive adhesive or alloy (alloy temperature should not exceed 300℃, and no more than 30 sec.), and should make it fully grounded.
4. The chip microwave port and substrate gap is not exceeding 0.05mm, with Φ25μm double gold wire bonding, suggested length of gold wire 250～400μm.
5. Chip microwave RF1 port without DC blocking capacitor, RF2 and RF3 port with a DC blocking capacitor.
6. The chip is sensitive to static electricity, and should be protected against static electricity during storage and use.