

SiGe HBT MMIC Wideband Linear Amplifier

Descriptions

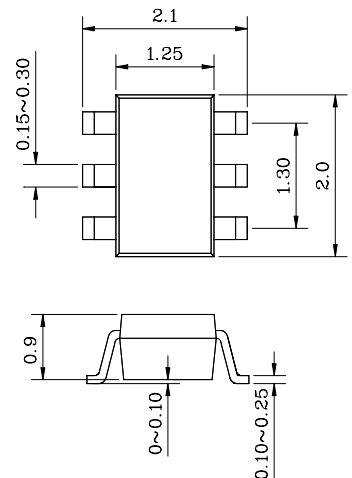
THM2004J is a high performance cascadeable 50-ohm amplifier. This RFIC uses the latest Silicon Germanium Hetero Junction Bipolar Transistor (TAHB09) process of Tachyonics Co., which has 30GHz f_T (Normal). THM2004J uses a multi feedback cascade amplifier topology with resistive feedback for broad band performance as well as stability over its entire temperature range. THM2004J also has internally matched 50 ohm impedance and wide bandwidth.

Features

- Wide band operation : $f_{3dB} = 2.2\text{GHz}$
- Single Voltage Supply
- Internally Matched to 50 Ohm Input & Output
- High Power Gain : 25dB at 1000MHz
- Saturated Output Power : $P_{o(sat)} = +12\text{dBm}$ at 1000MHz

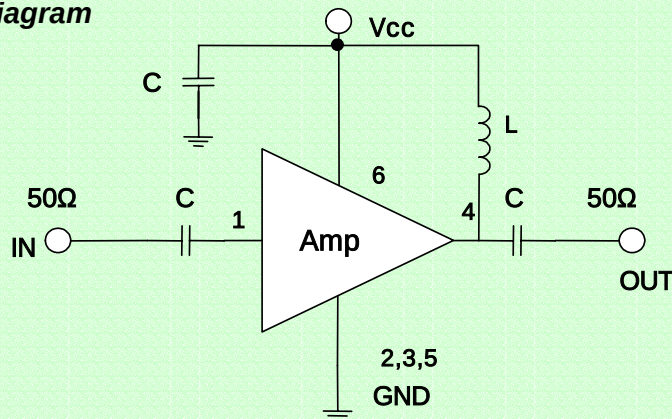
Applications

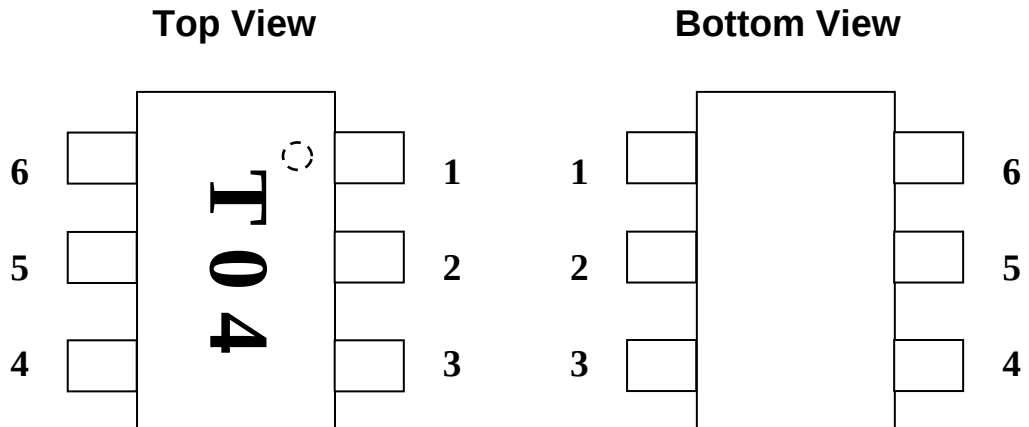
- DBS, LNB , Medium Output
- Transmission Stage Buffer (Mobile Communication)
- IF/RF Buffer Amplifier



SOT363

Function Block Diagram



Pin Configuration**Pin Description**

Pin No.	Name	Description
1	IN	RF SIGNAL INPUT
2	GND	GROUND
3	GND	GROUND
4	OUT	RF SIGNAL OUTPUT
5	GND	GROUND
6	VCC	POWER SUPPLY

Pin Explanation

Pin No	Pin Name	Applied Voltage [V]	Pin Voltage [V]	Function	Internal equivalent circuit
1	IN	-	0.98	Signal Input pin. A internal matching circuit, configured with resistors, enables 50 Ω impedance connection over a wide band. This pin must be coupled to signal source with capacitor for DC blocking.	
4	OUT	4.5~5.5	-	Signal output pin. The inductor must be connected between pin VCC and OUT for Output TR BIAS and output choke. A internal matching circuit, configured with resistors, enables 50 Ω impedance connection over a wide band. This pin must be coupled to next stage input with capacitor for DC blocking.	
6	VCC	4.5~5.5	-	DC power supply pin. This pin should be externally connected to bypass capacitor to minimize ground impedance.	
2 3 5	GND	0	-	Ground pins. This pins should be connected to system ground with minimum inductance. All the ground pins must be connected common with wide ground pattern to minimized impedance difference	

Note : Pin voltage is measured at Vcc = 5.0 V

Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	6	V
Supply Current	60	mA
RF Input Power	+10	dBm
Operation Temperature Range	-40 to +85	
Maximum Junction Temperature	+150	
Storage Temperature Range	-55 to +150	

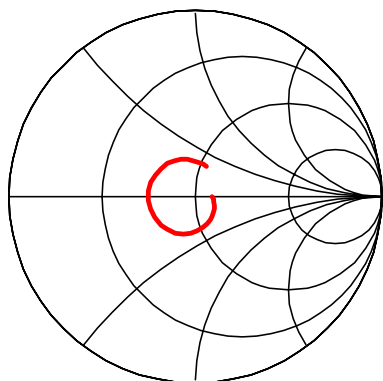
Electrical Characteristics

($T_A = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, $L1 = 220\text{nH}$, $Z_S = Z_L = 50\Omega$)

Symbol	Parameter	Condition	Specification			Unit
			Min.	Typ.	Max.	
f_{3dB}	Upper 3dB cut off frequency		2000	2200	-	MHz
Gp	Power Gain	$f = 1000\text{MHz}$	22	25	27	dB
$P_{O(sat)}$	Saturated output power	$f = 1000\text{MHz}$	+9	+12	-	dBm
RL_{IN}	Input Return Loss	$f = 1000\text{MHz}$	9	16	-	dB
RL_{OUT}	Output Return Loss	$f = 1000\text{MHz}$	7	13	-	dB
NF	Noise Figure	$f = 1000\text{MHz}$	-	4.0	6.0	dB
ISL	Isolation	$f = 1000\text{MHz}$	26	32	-	dB
I_{CC}	Bias Current	No Input Signal	19	25	32	mA

Typical Characteristics

Input Reflection Coefficient



Output Reflection Coefficient

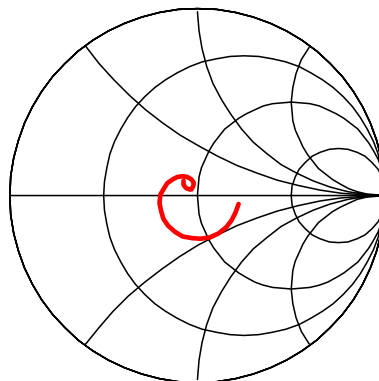


Fig1. Input/Output Impedance

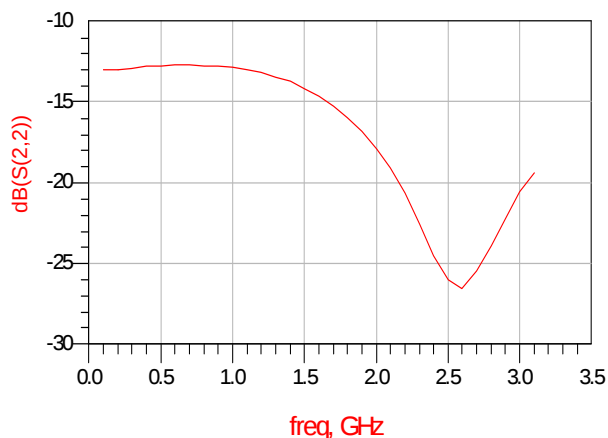
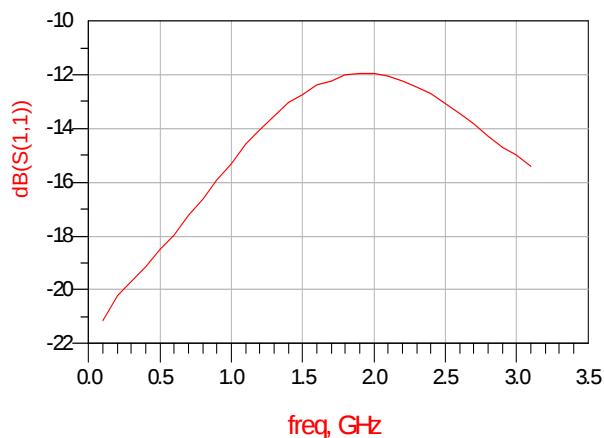


Fig2. Input/Output Return Loss

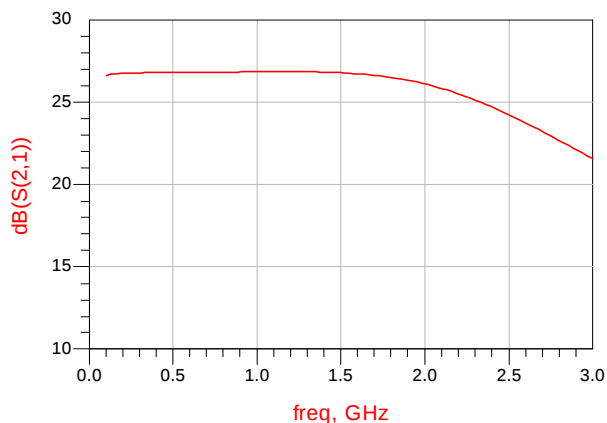


Fig3. Small Signal Gain

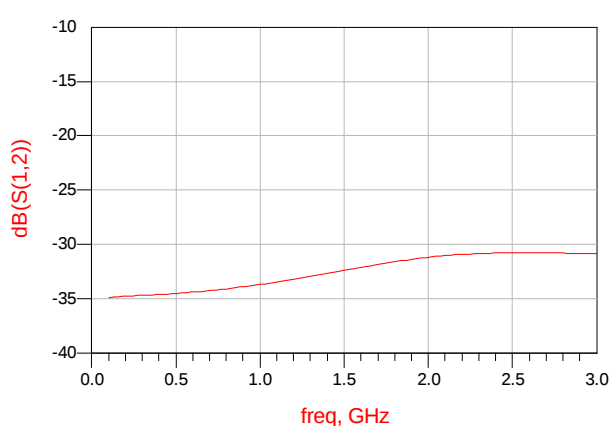


Fig4. Isolation

Typical Characteristics

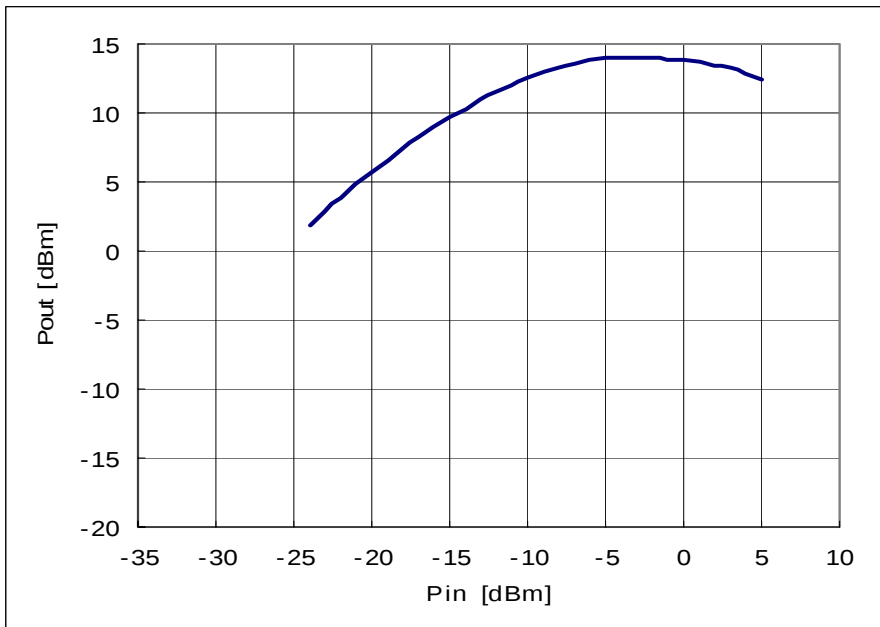


Fig5. 1000MHz Power Sweep

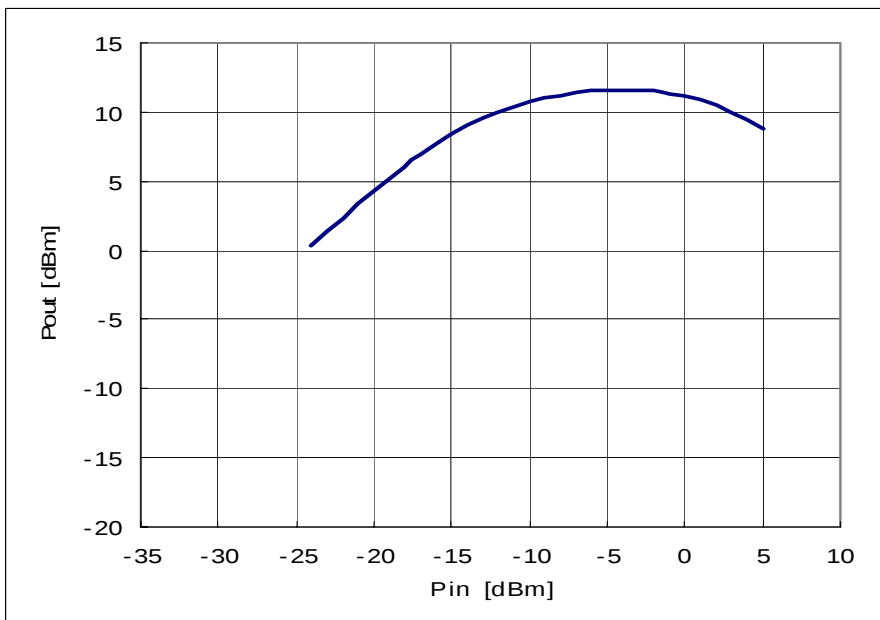


Fig6. 2000MHz Power Sweep

Typical Characteristics

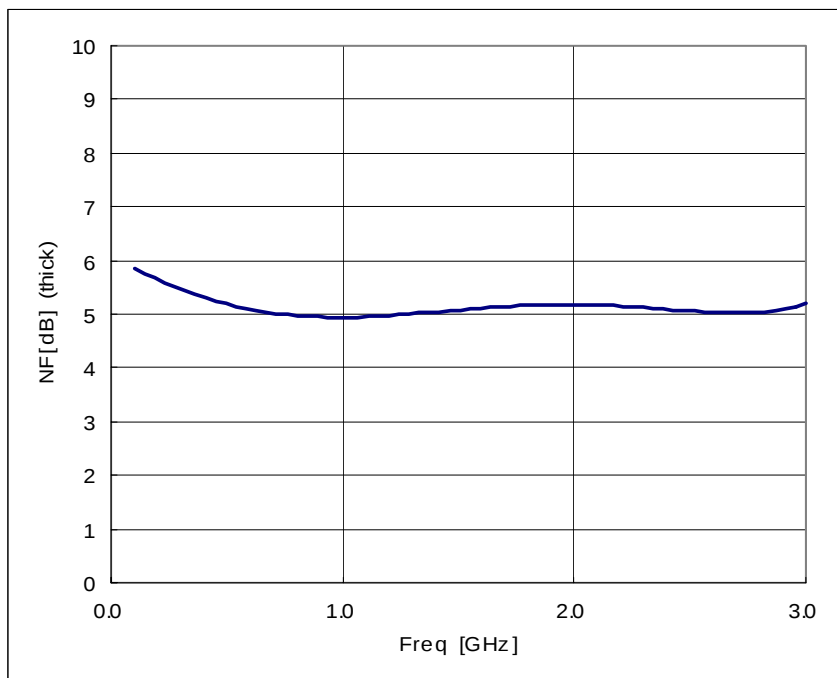
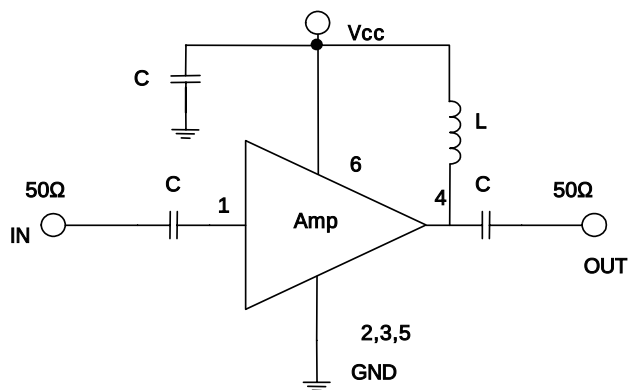
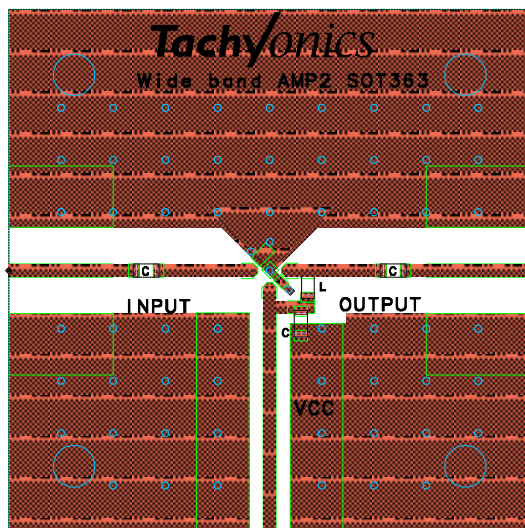


Fig7. Noise Figure

Test Circuit



Evaluation Board

Board Size 30 x 30 mm²

NOTE

Board Thickness 0.3mm
Board Material FR4
Double Layer

Component List

Name	Value	Remark
C	1000 pF	100MHz or higher frequency
L	220 nH	100MHz or higher frequency