MGA-53543

5V High Linearity LNA, 39dBm OIP3, 0.45-6GHz, SOT343(SC-70)

Description

This E-pHEMT RFIC is an easy-to-use power-efficient high linearity low noise amplifier built on Avago's leading edge E-pHEMT technology.

It is ideal as a driver amplifier in the transmit chain or as a second stage LNA in the receive chain of basestation designs. Other applications may include Cellular/PCS/W-CDMA Base Station radio-cards, fixed wireless, wireless LAN and other high performance applications in the 450 MHz to 6 GHz frequency range.

Lead (PB) Free
RoHS 6 fully compliant

Lifecycle status: Active

Features

Typical performance at 2 GHz 5V/54mA is NF=1.5dB, OIP3=39dBm, P1dB=18.6dBm and Ga=15.4dB."

MGA-53543
50 MHz to 6 GHz High Linear Amplifier

Data Sheet

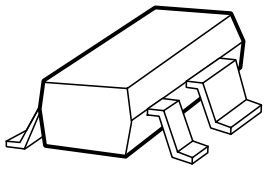
Description

Avago Technologies's MGA-53543 is a high dynamic range low noise amplifier MMIC housed in a 4-lead SC-70 (SOT-343) surface mount plastic package.

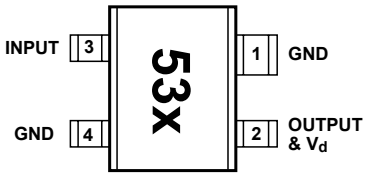
The combination of high linearity, low noise figure and high gain makes the MGA-53543 ideal for cellular/PCS/ W-CDMA base stations, Wireless LAN, WLL and other systems in the 50 MHz to 6 GHz frequency range.

MGA-53543 is especially ideal for Cellular/PCS/ W-CDMA basestation applications. With high IP3 and low noise figure, the MGA-53543 may be utilized as a driver amplifier in the transmit chain and as a second stage LNA in the receive chain.

Surface Mount Package
SOT-343/4-lead SC70



Pin Connections and Package Marking



Note:
Top View. Package marking provides orientation and identification.
"53" = Device Code
"x" = Date code character identifies month of manufacture.

Attention: Observe precautions for handling electrostatic sensitive devices.
ESD Machine Model (Class A)
ESD Human Body Model (Class 1A)
Refer to Avago Application Note A004R: lectrostatic Discharge Damage and Control.

Features

- Lead-free Option Available
- Very high linearity at low DC bias power[1]
- Low noise figure
- Advanced enhancement mode PHEMT technology
- Excellent uniformity in product specifications
- Low cost surface mount small plastic package SOT-343 (4-lead SC-70)
- Tape-and-Reel packaging option available

Specifications
1.9 GHz, 5V, 54 mA (typ)

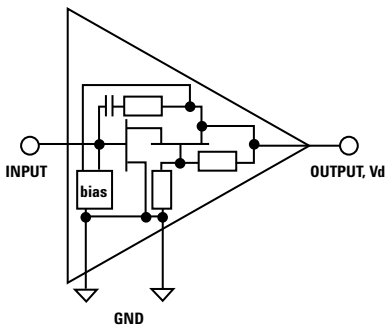
- OIP3: 39 dBm
- Noise figure: 1.5 dB
- Gain: 15.4 dB
- P-1dB: 18.6 dBm

Applications

- Base station radio card
- High linearity LNA for base stations, WLL, WLAN, and other applications in the 50 MHz to 6 GHz range

Note:
1. The MGA-53543 has a superior LFOM of 15 dB. Linearity Figure of Merit (LFOM) is essentially OIP3 divided by DC bias power. There are few devices in the market that can match its combination of high linearity and low noise figure at the low DC bias power of 5V/54 mA.

Simplified Schematic



MGA-53543 Absolute Maximum Ratings [1]

Symbol	Parameter	Units	Absolute Maximum
V_{in}	Maximum Input Voltage	V	0.8
V_d	Supply Voltage	V	5.5
P_d	Power Dissipation [2]	mW	400
P_{in}	CW RF Input Power	dBm	13
T_j	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150

Thermal Resistance [3]

(Vd=5.0V) θjc = 130°C/W

Notes:
1. Operation of this device in excess of any of these limits may cause permanent damage.
2. Source lead temperature is 25°C. Derate 7.7mW/°C for $T_L > 98°C$
3. Thermal resistance measured using 150°C Liquid Crystal Measurement Technique.

Electrical Specifications

T_c = +25°C, Z_o = 50 Ω, V_d = 5V, unless noted

Symbol	Parameter and Test Condition	Frequency	Units	Min.	Typ.	Max.	σ [3]
I_d	Current Drawn	N/A	mA	40	54	70	2.7
NF [1]	Noise Figure	2.4 GHz			1.9		
		1.9 GHz	dB		1.5	1.9	0.06
		0.9 GHz			1.3		
Gain [1]	Gain	2.4 GHz			15.1		
		1.9 GHz	dB	14	15.4	17.0	0.25
		0.9 GHz			17.4		
OIP3 [1,2]	Output Third Order Intercept Point	2.4 GHz			38.7		
		1.9 GHz	dBm	36	39.1		1.89
		0.9 GHz			39.7		
P1dB [1]	Output Power at 1 dB Gain Compression	2.4 GHz			18.3		
		1.9 GHz	dBm		18.6		
		0.9 GHz			19.3		
PAE [1]	Power Added Effciency at P1dB	1.9 GHz	%		29.7		
		0.9 GHz	%		28.3		
RL_{in} [1]	Input Return Loss	2.4 GHz			-12.7		
		1.9 GHz	dB		-13.2		
		0.9 GHz			-11.1		
RL_{out} [1]	Output Return Loss	2.4 GHz			-25.1		
		1.9 GHz	dB		-14.3		
		0.9 GHz			-14.4		
ISOL [1]	Isolation $\|s_{12}\|^2$	1.9 GHz	dB		-23.4		
		0.9 GHz			-22.3		

Notes:
1. Measurements obtained from a test circuit described in Figure 1. Input and output tuners tuned for maximum OIP3 while keeping VSWR better than 2:1. Data corrected for board losses.
2. I) Output power level and frequency of two fundamental tones at 1.9 GHz: F1 = 5.49 dBm, F2 = 5.49 dBm, F1 = 1.905 GHz, and F2 = 1.915 GHz. II) Output power level and frequency of two fundamental tones at 900 MHz: F1 = -0.38 dBm, F2 = -0.38 dBm, F1 = 905 MHz, and F2 = 915 MHz.
3. Standard deviation data are based on at least 500 pieces sample size taken from 8 wafer lots. Future wafers allocated to this product may have nominal values anywhere between the upper and lower spec limits.

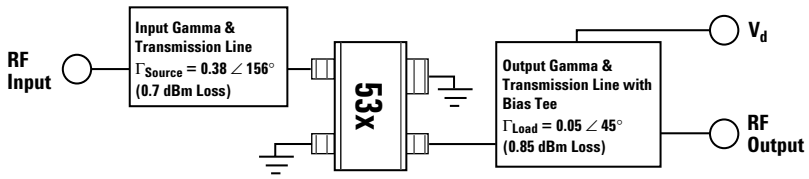


Figure 1. Block Diagram of 1.9 GHz Test Fixture.

Summary

In summary, the MGA-53543 offers very high IP3 as designed, but is versatile enough to give good NF performance wherever needed. Below is a summary of the preceding four examples.

Table 7. 1900 MHz and 900 MHz HLA and 1900 MHz and 900 MHz LNA summary.

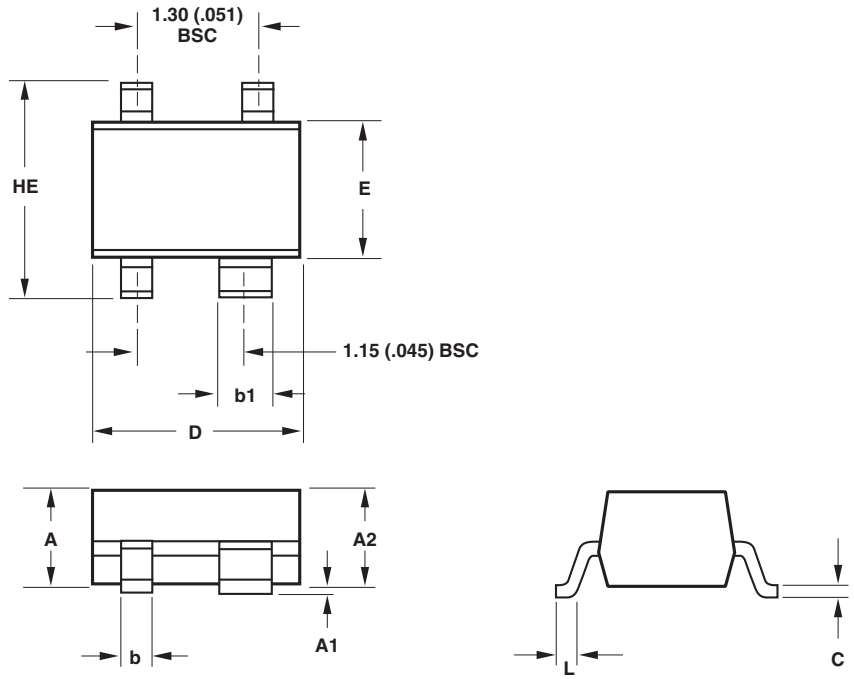
	1900 MHz	900 MHz
HLA	NF = 1.78 dB OIP3 = 38 dBm Ga = 14.5 dB P1dB = 17.8 dBm	NF = 1.42 dB OIP3 = 40 dBm Ga = 17.1 dB P1dB = 18.8 dBm
LNA	NF = 1.62 dB OIP3 = 37 dBm Ga = 14.8 dB P1dB = 18.0 dBm	NF = 1.33 dB OIP3 = 36 dBm Ga = 17.4 dB P1dB = 19.0 dBm

Part Number Ordering Information

Part Number	No. of Devices	Container
MGA-53543-TR1G	3000	7" Reel
MGA-53543-TR2G	10000	13" Reel
MGA-53543-BLKG	100	antistatic bag

Package Dimensions

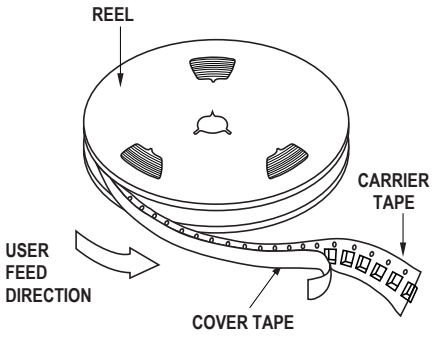
Outline 43 (SOT-343/SC70 4 lead)

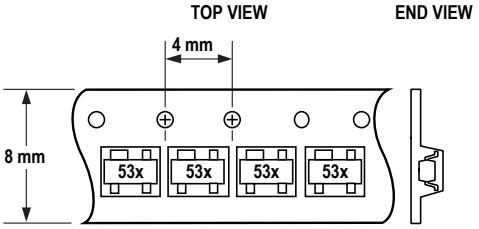


SYMBOL	DIMENSIONS (mm) MIN.	MAX.
E	1.15	1.35
D	1.85	2.25
HE	1.80	2.40
A	0.80	1.10
A2	0.80	1.00
A1	0.00	0.10
b	0.25	0.40
b1	0.55	0.70
c	0.10	0.20
L	0.10	0.46

NOTES:
1. All dimensions are in mm.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. All specifications comply to EIAJ SC70.
5. Die is facing up for mold and facing down for trim/form, ie: reverse trim/form.
6. Package surface to be mirror finish.

Device Orientation

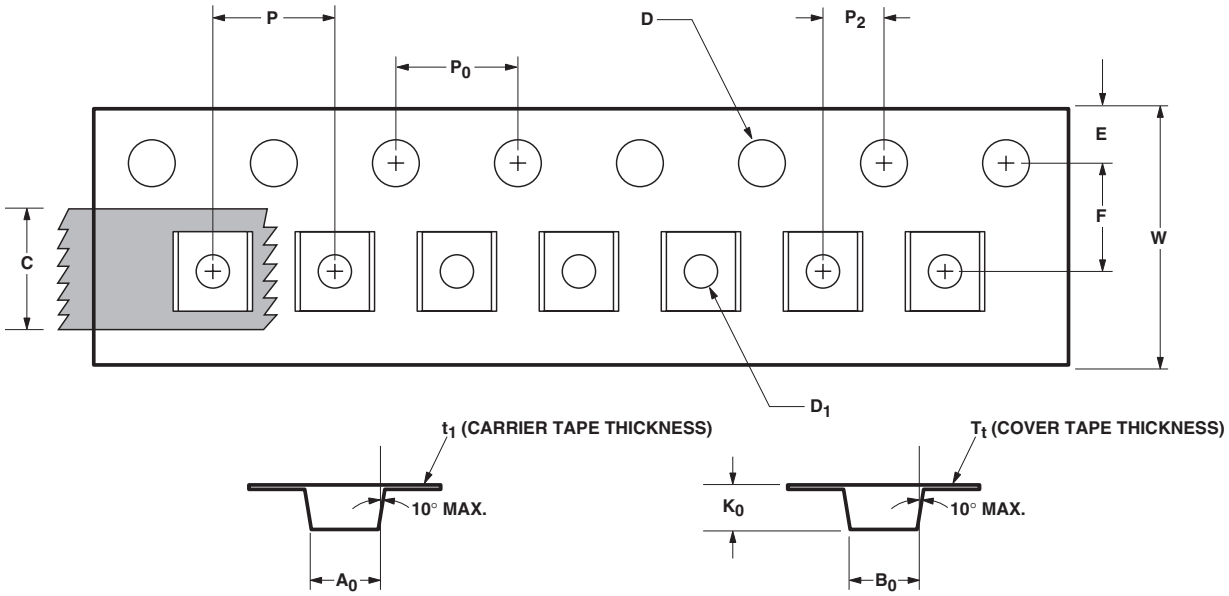




(Package marking example orientation shown.)

Tape Dimensions

For Outline 4T



DESCRIPTION		SYMBOL	SIZE (mm)	SIZE (INCHES)
CAVITY	LENGTH	A_0	2.40 ± 0.10	0.094 ± 0.004
	WIDTH	B_0	2.40 ± 0.10	0.094 ± 0.004
	DEPTH	K_0	1.20 ± 0.10	0.047 ± 0.004
	PITCH	P	4.00 ± 0.10	0.157 ± 0.004
	BOTTOM HOLE DIAMETER	D_1	1.00 + 0.25	0.039 + 0.010
PERFORATION	DIAMETER	D	1.55 ± 0.10	0.061 + 0.002
	PITCH	P_0	4.00 ± 0.10	0.157 ± 0.004
	POSITION	E	1.75 ± 0.10	0.069 ± 0.004
CARRIER TAPE	WIDTH	W	8.00 + 0.30 - 0.10	0.315 + 0.012
	THICKNESS	t_1	0.254 ± 0.02	0.0100 ± 0.0008
COVER TAPE	WIDTH	C	5.40 ± 0.10	0.205 + 0.004
	TAPE THICKNESS	T_t	0.062 ± 0.001	0.0025 ± 0.0004
DISTANCE	CAVITY TO PERFORATION (WIDTH DIRECTION)	F	3.50 ± 0.05	0.138 ± 0.002
	CAVITY TO PERFORATION (LENGTH DIRECTION)	P_2	2.00 ± 0.05	0.079 ± 0.002