AMMC-5023

23 GHz Low Noise Amplifier

Description

Avago's AMMC-5023 is a high gain, low noise amplifier that operates from 21 GHz to over 30 GHz.

The device has good input and output match to 50 Ohm and is unconditionally stable to more than 40 GHz.

Lifecycle status: Active

Features

- Frequency Range: 21.2 - 26.5 GHz
- High Gain: 23 dB
- Low Noise Figure: 2.3 dB
- Input and Output Return Loss: < 10 dB
- Single Supply Bias 5 volts, 28 mA
- Optional Bias Adjust

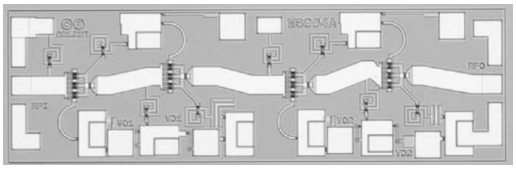
Applications

- Digital Radio Communication Systems (21.2–23.6 GHz and 24.5–26.5 GHz)
- Any narrow band application within 21 –26 GHz
- 24.1 GHz collision avoidance
- Front-end gain stage

AMMC-5023

23 GHz Low Noise Amplifier (21.2 – 26.5 GHz)

Data Sheet



Chip Size: 1880 x 600 µm (74 x 23.6 mils)
Chip Size Tolerance: ±10 µm (±0.4 mils)
Chip Thickness: 100 ± 10 µm (4 ± 0.4 mils)
Pad Dimensions: 80 x 80 µm (3.1 x 3.1 mils), or larger

Description

Avago's AMMC-5023 is a high gain, low noise amplifier that operates from 21 GHz to over 30 GHz. By eliminating the complex tuning and assembly processes typically required by hybrid (discrete-FET) amplifiers, the AMMC-5023 is a cost-effective alternative in both 21.2–23.6 GHz and 24.5–26.5 GHz communications receivers. The device has good input and output match to 50 Ohm and is unconditionally stable to more than 40 GHz. The backside of the chip is both RF and DC ground. This helps simplify the assembly process and reduces assembly related performance variations and costs. It is fabricated in a PHEMT process to provide exceptional noise and gain performance. For improved reliability and moisture protection, the die is passivated at the active areas.

Features

- Frequency range: 21.2 – 26.5 GHz
- High gain: 23 dB
- Low noise figure: 2.3 dB
- Input and output return loss: >10 dB
- Single supply bias: 5 volts, 28 mA
- Optional bias adjust

Applications

- Digital Radio Communication Systems (21.2–23.6 GHz and 24.5–26.5 GHz)
- Any narrow band application within 21 – 26 GHz
- 24.1 GHz collision avoidance
- Front-end gain stage

Absolute Maximum Ratings[1]

Symbol	Parameters/Conditions	Units	Min.	Max.
V_{D1}, V_{D2}	Drain Supply Voltage	V		8
V_{G1}, V_{G2}	Gate Supply Voltage	V	0.4	2
I_{D1}	Drain Supply Current	mA		35
I_{D2}	Drain Supply Current	mA		35
P_{in}	RF Input Power	dBm		15
T_{ch}	Channel Temperature	°C		+150
T_b	Operating Backside Temperature	°C	-55	+140
T_{stg}	Storage Temperature	°C	-65	+165
T_{max}	Max. Assembly Temp (60 sec max)	°C		+300

Notes:
1. Absolute maximum ratings for continuous operation unless otherwise noted.

AMMC-5023 DC Specifications/Physical Properties[1]

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
V_{D1}, V_{D2}	Recommended Drain Supply Voltage	V	3	5	7
V_{G1}, V_{G2}	Gate Supply Voltage[2] ($V_{D1} \le V_{D1(max)}$, $V_{D2} \le V_{D2(max)}$)	V		0.8	
I_{D1}, I_{D2}	Input and Output Stage Drain Supply Current ($V_{G1} = V_{G2}$ = Open, $V_{D1} = V_{D2} = 5$ V)	mA		14	
$I_{D1}+I_{D2}$	Total Drain Supply Current ($V_{G1} = V_{G2}$ = Open, $V_{D1} = V_{D2} = 5$ V)	mA	13	28	35
θ_{ch-b}	Thermal Resistance[3] (Backside temperature, T_b = 25°C)	°C/W		44	

Notes:
1. Backside ambient operating temperature T_A = 25°C unless otherwise noted.
2. Open circuit voltage at V_{G1} and V_{G2} when V_{D1} and V_{D2} are 5 Volts.
3. Channel-to-backside Thermal Resistance (θ_{ch-b}) = 66°C/W at $T_{channel}$ (T_c) = 150°C as measured using the liquid crystal method. Thermal Resistance at backside temperature (T_b) = 25°C calculated from measured data.

RF Specifications[4]

($V_{G1} = V_{G2}$ = Open, $V_{D1} = V_{D2} = 5$V, $I_{D1} + I_{D2} = 28$ mA, $Z_{in} = Z_0 = 50\Omega$)

				21.2 – 23.6 GHz			24.5–26.5 GHz	
Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.	Min.	Typ.	Max.
$\|S_{21}\|^2$	Small-signal Gain	dB	21	23.6	28	17	19	25
$\Delta\|S_{21}\|^2$	Small-signal Gain Flatness	dB		±1.5			±1.2	
RL_{in}	Input Return Loss	dB	10	12		10	11.5	
RL_{out}	Output Return Loss	dB	9	12		10	17	
$\|S_{12}\|^2$	Isolation	dB	40	50		40	43	
P_{-1dB}	Output Power @ 1 dB Gain Compression f = 23 GHz	dBm		9.5			10	
P_{sat}	Saturated Output Power (@ 3 dB Gain Compression)	dBm		10.5			11.5	
OIP3	Output 3rd Order Intercept Point, $Rf_{in1} = Rf_{in2}$ = -20 dBm, Δf = 2 MHz 22.4 GHz 25.5 GHz	dB		18			 24	
NF	Noise Figure 22 GHz 25 GHz	dB		2.3	2.8		 2.3	 2.8

Note:
4. 100% on-wafer RF test is done at frequency = 21.2, 22.4, 23.6, 24.5, 25.5 and 26.5 GHz, except as noted.

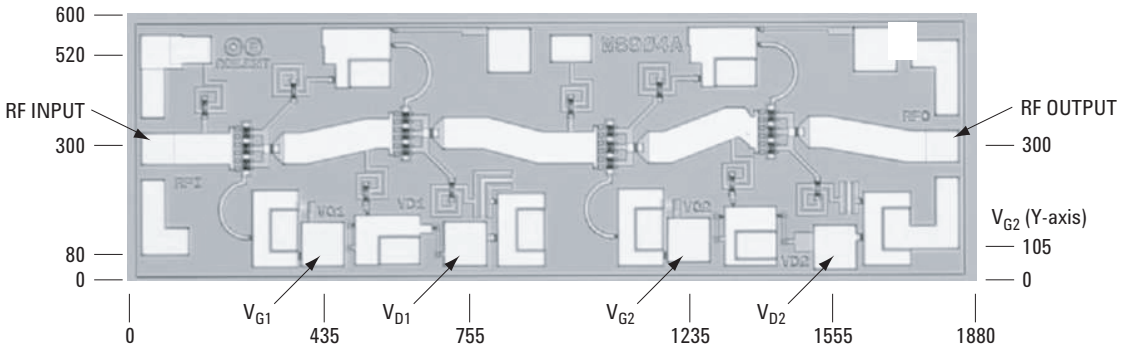


Figure 21. AMMC-5023 Bonding Pad Locations.
(dimensions in micrometers)

Ordering Information

AMMC-5023-W10 = 10 devices per tray
AMMC-5023-W50 = 50 devices per tray