WMA32C

32.19 MHz LOW NOISE LOW IMPEDANCE PRE-AMPLIFIER

REV C
August 2022

Key Features

- For 50 Ohm Source Impedance
- Frequency of 32.19 MHz
- 3.0 Ohm Input Impedance
- 0.70 dB Noise Figure
- 4.0 dBm $P_{0.1dB}$
- 23.0 dBm Output IP_3
- 28.0 dB Gain
- 9.0 dBm P_{1dB}
- 1.22:1 Output VSWR
- Unconditional Stable, *k*>1
- Single Power Supply
- Non Magnetic

Product Description

With its low input impedance, WMA32C is designed for 50 Ohm source impedance multi-channel coil applications. The pre-amp maintains excellent noise figure performance over source impedance variation that either comes from the different loads to the coils or not ideal design implementation of the coils. Moreover, the pre-amp allows higher source impedance design to increase the blocking impedance while maintaining superior SNR due to large equal noise circles.

Both input and output ports have built-in ESD protections circuitries.

Applications

- Magnetic Resonance Imaging
- RF Measurement
- Medical
- Current Sensor

Specifications

Due to White Tin plating, Nitrogen cabinet storage is recommended. Improper storage may affect the solderability!

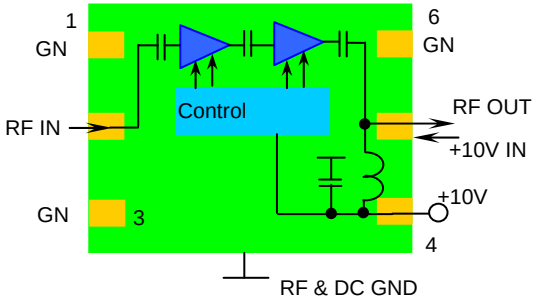
Summary of the key electrical specifications at room temperature

Index	Testing Item	Symbol	Test Constraints	Min	Nom	Max	Unit
1	Gain	S_{21}	32.19 MHz	27	28	29	dB
2	Gain Variation	ΔG	32.19 MHz +/- 1 MHz		+/-0.05	+/- 0.1	dB
3	Input Impedance	RE [Zin]	32.19 MHz, with 80050 test fixture		3.0	3.5	Ohm
		IM [Zin]	32.19, with 80050 test fixture	-3.0	0	3.0	Ohm
4	Output VSWR, 50 Ohm Impedance	SWR_2	32.19 MHz			1.22:1	Ratio
5	Reverse Isolation	S_{12}	32.19 MHz	70	80		dB
6	Noise Figure	NF	32.19 MHz, Z_s = 50 Ohm		0.7	1.0	dB
7	Output Power 0.1dB Compression Point	$P_{0.1dB}$	32.19 MHz	0	4		dBm
8	Output Power 1dB Compression Point	P_{1dB}	32.19 MHz	8	9		dBm
9	Output-Third-Order Interception Point	IP_3	Two-Tone, P_{out} = 0 dBm each, 1 MHz separation	18	23		dBm
10	Current Consumption	I_{dd}	V_{dd}= +10.0 V		18		mA
11	Power Supply Operating Voltage	V_{dd}		+7	+10	+12	V
12	Thermal Resistance	$R_{th,c}$	Junction to case			220	°C/W
13	Operating Temperature	T_o		+10		+60	°C
14	Maximum RF Input Power	$P_{IN, MAX}$	DC – 6.0 GHz, 10% Duty Cycle, Z_s = 50 Ohm			30	dBm
15	Saturate Recover Time	t_{sr}	10% to 90% from 20 dBm Pin, Z_s = 50 Ohm		4	8	uS
16	ESD Protection, None Contact	V_{ESDN}	RF Input & Output Ports			16	kV
17	ESD Protection, Direct Contact	V_{ESD}	RF Input & Output Ports			6	kV

Absolute Maximum Ratings

Parameters	Units	Ratings
DC Power Supply Voltage	V	12.0
Drain Current	mA	30
Total Power Dissipation	mW	350
RF Input Power, 10% Duty Cycle	dBm	30
Junction Temperature	°C	150
Storage Temperature	°C	-65 ~ 150
Operating Temperature	°C	0 ~ +70

Functional Block Diagram



Specifications and information are subject to change without notice.

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Thermal Resistance[1]	°C/W	220

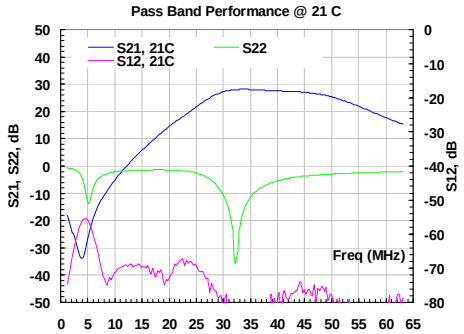
Operation of this device beyond any one of these parameters may cause permanent damage.

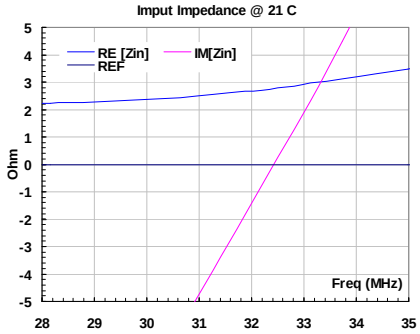
Ordering Information

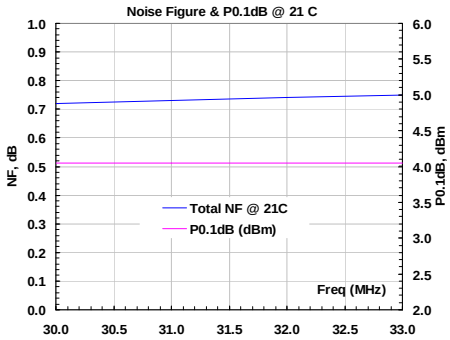
Model Number	WMA32C

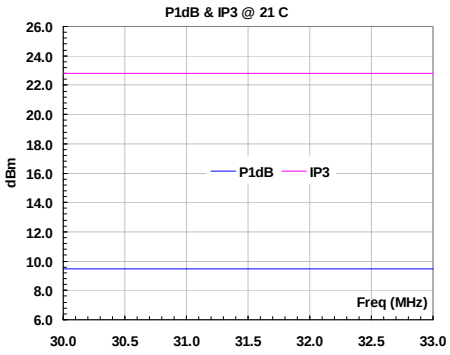
ESD pack is used for the packing. Contact factory for tape and reel packing option for higher volume order.

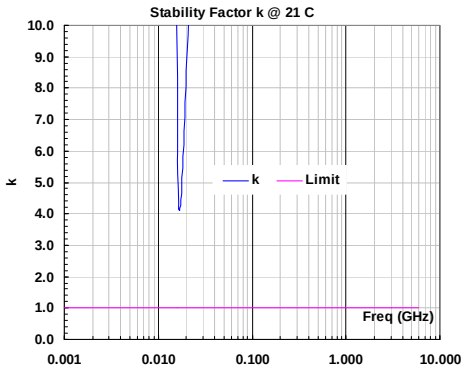
Typical Data





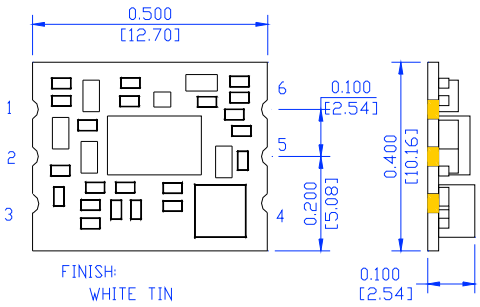


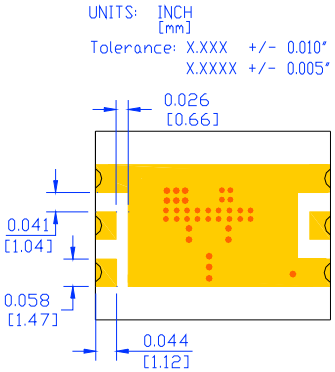




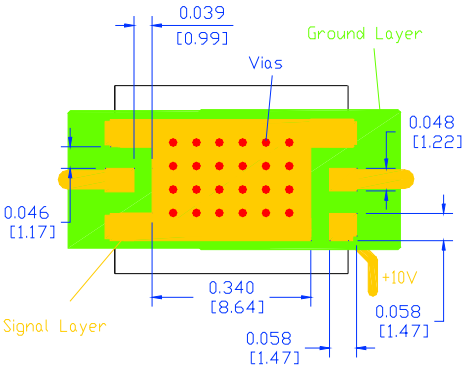
Outline

PIN	1	2	3	4	5	6	CNTR
FCTN	GND	IN	GND	NC/10V	OUT/10V	GND	GND





Foot Print/Mounting Layout



[1] The last stage transistor dominates the heat dissipation. The drain bias voltage is +3.5V and the drain current is 10.0 mA. The total power dissipation of the last stage transistor is thus 35 mW. The junction temperature arise 0.035 x 220 = 7.7 (^{0}C).

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Application Notes:

A. Motherboard Layout

The recommended motherboard layout is shown in diagram of **Foot Print/Mounting Layout**. Sufficient numbers of ground vias on center ground pad are essential for the RF grounding. The width of the 50-Ohm microstrip lines at the input and output RF ports may be different for different property of the substrate. The ground plane on the backside of the substrate is needed to connect the center ground pad through the vias. The ground plane is also essential for the 50-Ohm microstrip line launches at the input and output ports.

The +10V DC voltage is applied at Pin 4 or at the output Pin 5. There is a built-in bias-T at the output port to separate the RF output signal and input +10V DC power supply.

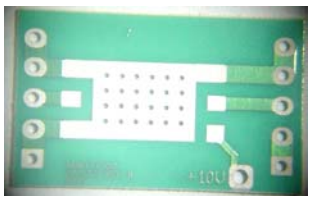

Fig. 1 Example of the motherboard

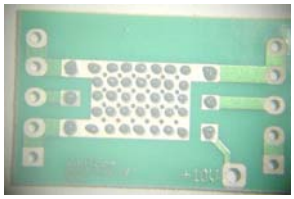

Fig. 2 Dispensed solder paste

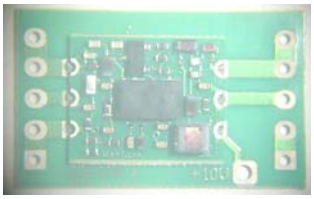

Fig. 3 Assembled

B. Assembly

The regular low temperature and none clean solder paste such as SN63/Pb37 is recommended. The high temperature solder has been used internally for the WHM series amplifier assembly. The melting temperature point of the high temperature solder is around 217 ~ 220 ^{0}C. Thus, melting temperature of the solder paste should be below 217 ^{0}C for assembling WHM series amplifier on the test board to reduce the possible damage. The temperature melting point of the SN63/Pb37 solder paste is around 183 ^{0}C and is suitable for the assembly purpose.

The SN63/Pb37 solder paste can be dispensed by a needle manually or driven by a compressed air. **Figure 2** shows the example of the dispensed solder paste pattern. Each solder paste dot is in the diameter of 0.005” ~ 0.010” (0.125 ~ 0.250 mm).

For volume assembly, a stencil with 0.006” (0.15 mm) is recommended to print the solder paste on the circuit board.

For more detail assembly process, refer to AN-109 at www.wantcominc.com website.

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