

### Description

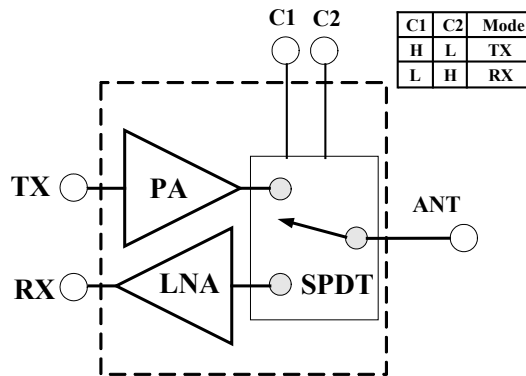
The MABT01 contains a power amplifier (PA), a low noise amplifier (LNA), and a SPDT switch. It is a 16-pins IC by 3×3mm<sup>2</sup>-QFN package. RF input and output impedance of MABT01 are 50Ω matched. Therefore, precious real estate of circuit board is saved when MABT01 is used. Besides, there is one more precious advantage of MABT01. MABT01 and MCP01 are pin-to-pin compatible. Compared with MABT01, MCP01's maximum output power is 5dB higher but consumes around 50mA more of current. When longer communication range is critical in a different wireless communication market, the MABT01 in the original circuit board could be replaced by MCP01 directly without modification of the original PCB. However, if this feature is desired, please layout the PCB based on MCP01's data sheet (especially the land pattern). With the use of MABT01, it will offer convenience, flexibility and cost saving.

### Features

- 12.8dBm P1dB and 16dB gain for transmitting RF signal
- 2.2dB NF and 12dB gain for receiving RF signal
- All PA, LNA and SPDT switch contained in a 16 pins 3×3mm<sup>2</sup>-QFN package
- Adjustable turn-on voltage levels

### Applications

- Bluetooth
- 2.4 GHz ISM band application.
- Wireless phone



### Absolute Maximum Ratings

DC Supply Voltage .....	6V
DC Supply Current .....	40 mA
RF Input Power .....	5 dBm
VSWR of Output Load .....	10:1
Operating Ambient Temperature .....	-40 °C to 85 °C
Storage Temperature .....	-60 °C to 150 °C
Maximum Junction Temperature (T <sub>j</sub> max) °C .....	150 °C

Maxi-AMP INC (民瑞科技股份有限公司) Innovation Incubation Center, Rm.3A19, No.1, Sec. 1, Syuecheng Rd., Dashu Township, Kaohsiung County, 840, Taiwan, R.O.C. [www.maxiamp.com](http://www.maxiamp.com)

Maxi-AMP incorporation reserves the right of changing the specifications without any prior notice.

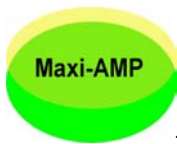
This device is ESD sensitive.

TEL : 0983001600, 0922305109, 0932698745, (07)343-1110

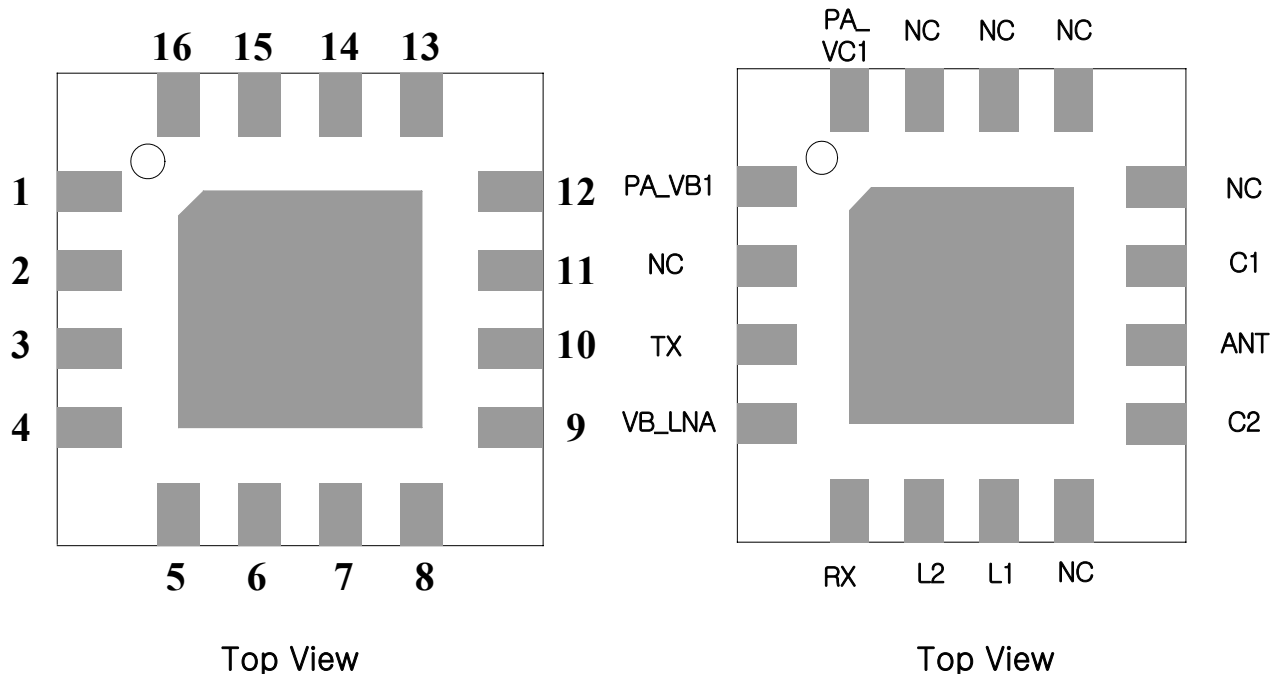
FAX : (07)657-9714 , Taiwan, R.O.C.

MBBT01\_r4. Preliminary data sheet, March/2011

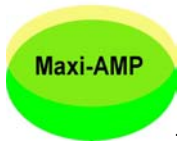
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### Pin Assignment



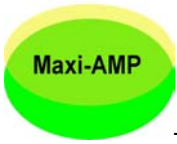
Pin No.	Name	Function
1	PA_VB1	Bias-voltage input for the 1 <sup>st</sup> -stage's base of PA
2	NC	Not connected
3	TX	RF power input of PA
4	VB_LNA	Bias-voltage input for the base of LNA
5	RX	RF power output of LNA
6	L2	Connection pin for inductor
7	L1	Connection pin for inductor
8	NC	Not connected
9	C2	Digital control voltage input of switch
10	ANT	Connection pin to antenna
11	C1	Digital control voltage input of switch
12	NC	Not connected
13	NC	Not connected
14	NC	Not connected
15	NC	Not connected
16	PA_VC1	Bias-voltage input for the 1 <sup>st</sup> -stage's collector of PA



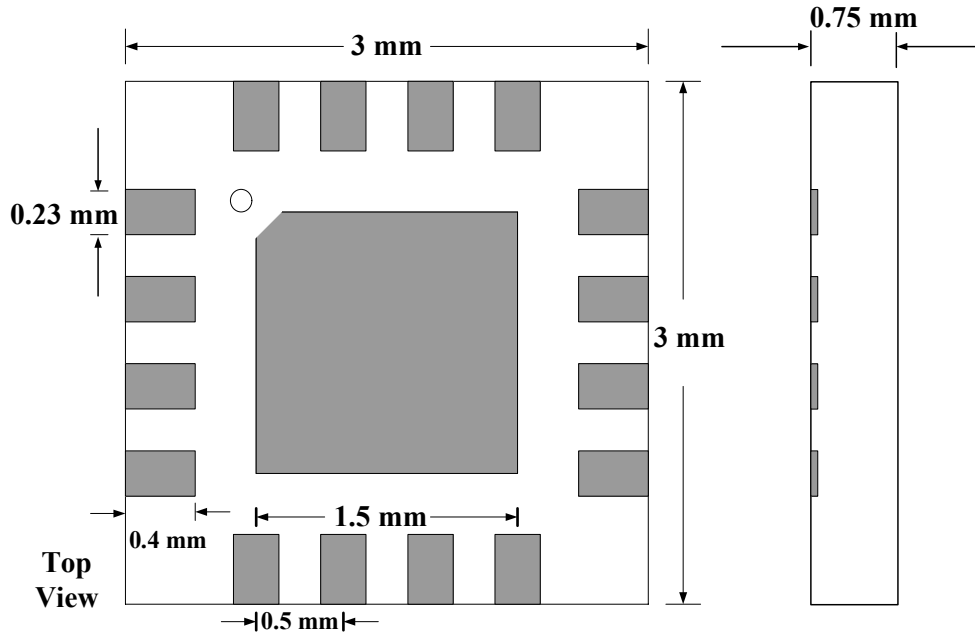
### Electrical Characteristics (Temperature=25°C)

Parameter	Symbol	Description	Min	Typical	Max	Units
Frequency Range	Freq		2.4	2.45	2.5	GHz
DC Supply Voltage	V <sub>CC</sub>			3.3		V
Collector's DC Supply Current (PA)	I <sub>PA_C</sub>			16		mA
Collector's DC Supply Current (LNA)	I <sub>LNA_C</sub>			7		mA
Base's DC Supply Current (PA)	I <sub>PA_B</sub>				0.3	mA
Base's DC Supply Current (LNA)	I <sub>LNB_B</sub>				0.1	mA
Input Voltage of C1	V <sub>C1</sub>	'1' ranges from 2.2V to V <sub>CC</sub> '0' ranges 0V to 0.2V.	0		V <sub>CC</sub>	V
Input Voltage of C2	V <sub>C2</sub>	'1' ranges from 2.2V to V <sub>CC</sub> '0' ranges 0V to 0.2V.	0		V <sub>CC</sub>	V
PA's Small-Signal Power Gain	G <sub>PA</sub>	V <sub>C1</sub> ='1', V <sub>C2</sub> ='0' Including 0.5dB loss by switch		16		dB
LNA's Small-Signal Power Gain	G <sub>LNA</sub>	V <sub>C1</sub> ='0', V <sub>C2</sub> ='1' Including 0.5dB loss by switch		12		dB
Gain Flatness (PA)				0.55		dB
Gain Flatness (LNA)				0.5		dB
Noise Figure of LNA	NF	Including 0.5dB loss by switch		2.2		dB
P1dB (PA)	P1dB <sub>P</sub>	Including 0.5dB loss by switch		12.8		dBm
P1dB (LNA)	P1dB <sub>L</sub>			1.5		dBm
2 <sup>nd</sup> Harmonics (PA)	2fo	12.5dBm RF power at pin ANT		-42		dBc
3 <sup>rd</sup> Harmonics (PA)	3fo	12.5dBm RF power at pin ANT		-51		dBc
VSWR of PA's Output	S22 <sub>ANT</sub>	Small-signal, V <sub>C1</sub> ='1', V <sub>C2</sub> ='0'		1.8		
VSWR of PA's Input	S11 <sub>TX</sub>	Small-signal, V <sub>C1</sub> ='1', V <sub>C2</sub> ='0'		1.1		
VSWR of LNA's Input	S11 <sub>ANT</sub>	Small-signal, V <sub>C1</sub> ='0', V <sub>C2</sub> ='1'		2.4		
VSWR of LNA's Output	S22 <sub>RX</sub>	Small-signal, V <sub>C1</sub> ='0', V <sub>C2</sub> ='1'		1.8		
Isolation		12.5dBm RF power at pin ANT V <sub>C1</sub> ='1', V <sub>C2</sub> ='0', from pin ANT to pin RX		-37		dB

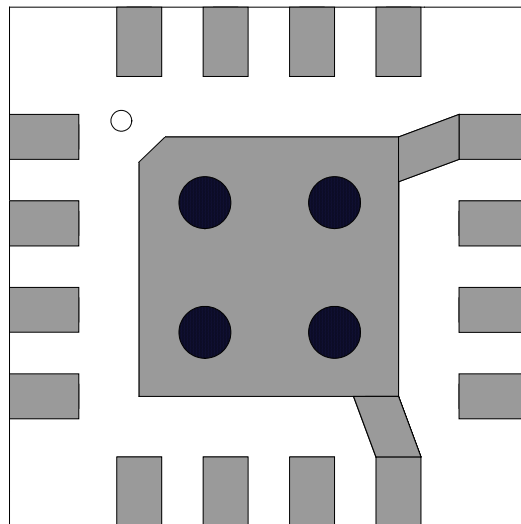
\* If not specified, all data are measured at 2.45 GHz.



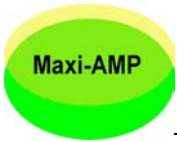
### Dimensions of Package



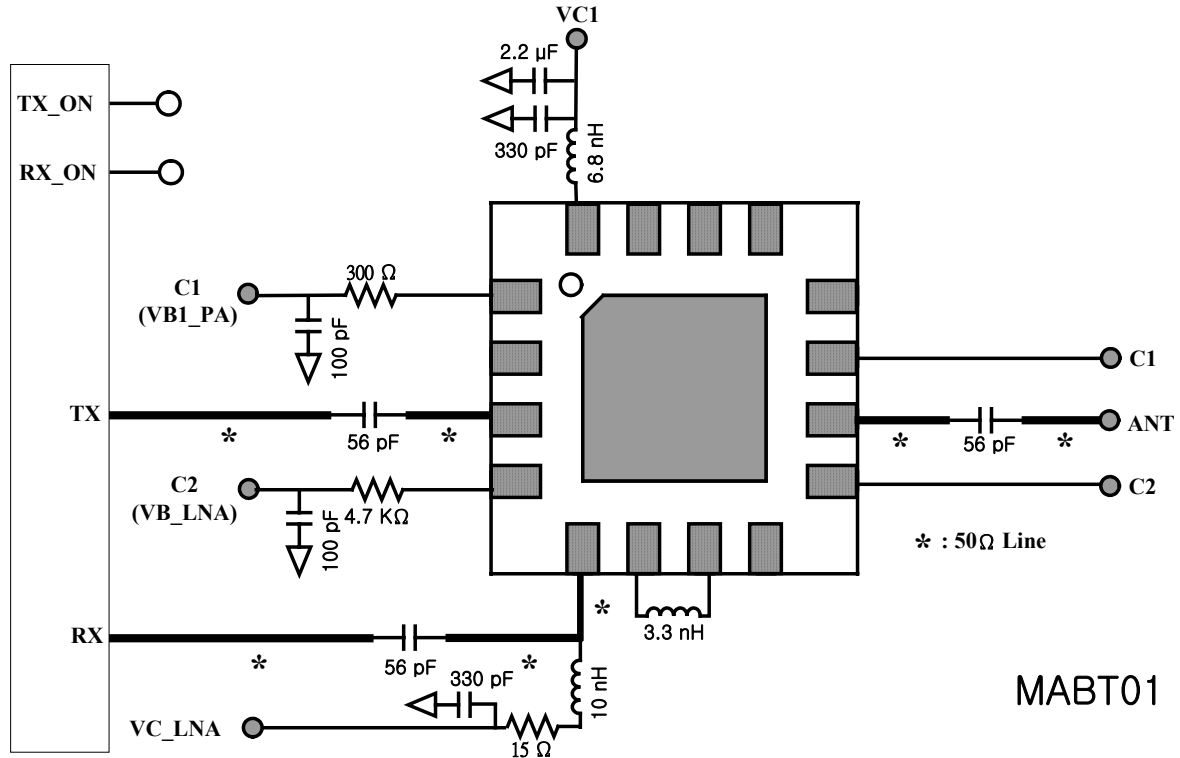
### Land Pattern



Top View



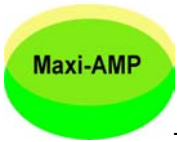
### Application Circuit



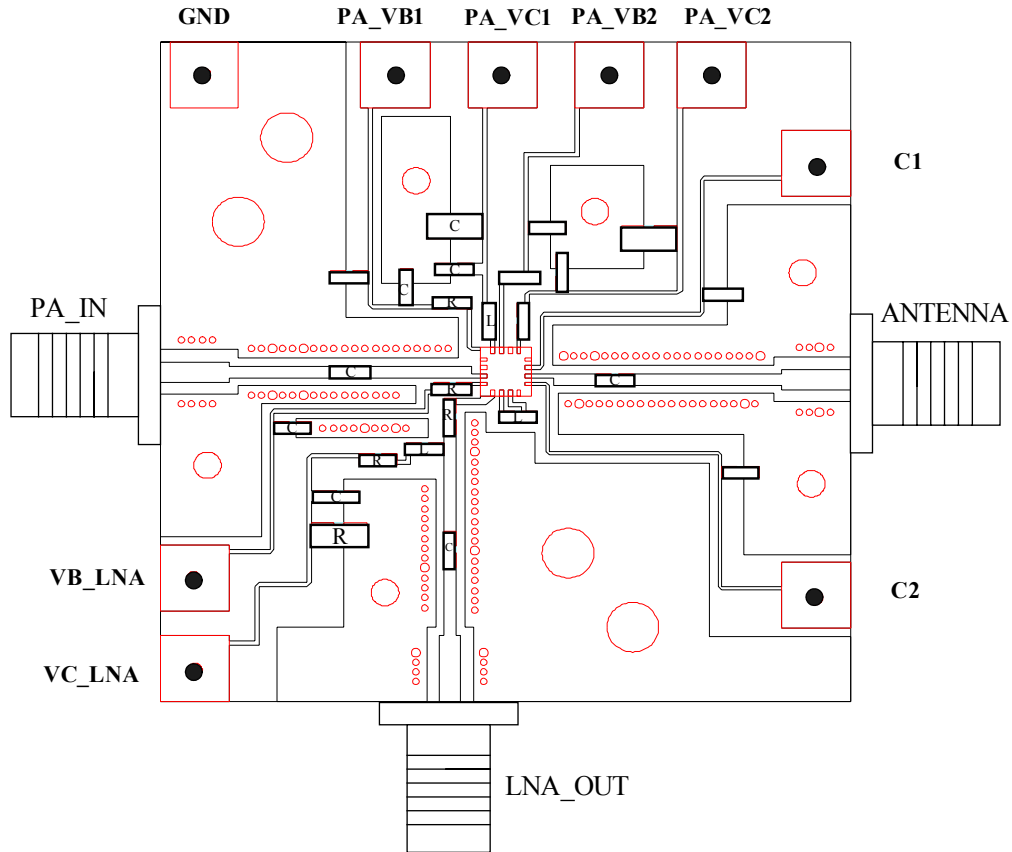
MABT01

On the above application circuit, ports Vcc are connected to fixed bias, such as 3.3V. Ports C1, C2, VB\_LNA, and VB1\_PA are used as on/off control as well as bias control for PA and LNA. Usually, C1, and VB1\_PA are connected to TX\_ON, C2 and VB\_LNA are connected to RX\_ON. Both TX\_ON and RX\_ON are digital control signals that are provided by transceiver or base-band chip. When TX\_ON outputs “high”, it indicates the system is in the transmitting mode. When RX\_ON outputs “high”, it indicates the system is in the receiving mode. Resistors 300Ω, and 4.7KΩ are for TX\_ON and RX\_ON that are operated at 3.3V. Their values need to be changed if different voltage level of TX\_ON and RX\_ON (such as 3.1V) are used. You may contact us for proper resistor’s values.

MABT01 and MCP01 are pin-to-pin compatible. If direct replacement of MABT01 by MCP01 is desired, please layout the PCB based on MCP01’s data sheet (especially the land pattern).



### Evaluation Board



Name	Function
GND	Ground
PA_VB1	Bias-voltage input for the 1 <sup>st</sup> -stage's base of PA
PA_VC1	Bias-voltage input for the 1 <sup>st</sup> -stage's collector of PA
PA_VB2	Not used
PA_VC2	Not used
C1	Digital control voltage input of switch
C2	Digital control voltage input of switch
VC_LNA	Bias-voltage input for the collector of LNA
VB_LNA	Bias-voltage input for the base of LNA

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