

MAPHS1

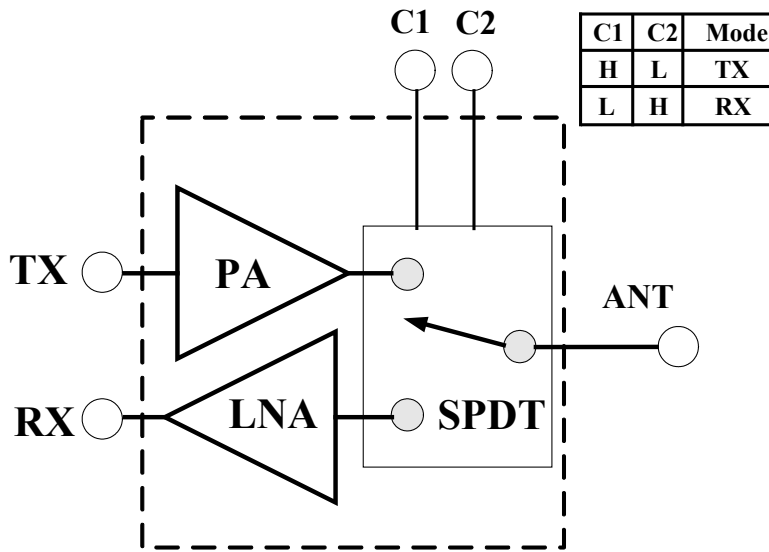
1.9 GHz RF Front End IC

Features

- 22dBm P1dB and 26.5dB gain of PA channel.
- 1.9dB NF and 14dB gain of LNA channel.
- Total current consumption of PA varies with input power level.
- The voltage levels of turn-on bias control for both PA and LNA are adjustable.
- RF input and output ports are 50Ω matched.
- All PA, LNA and SPDT switch are contained in a 16 pins 3×3mm²-QFN package.

Applications

- 1.9GHz PHS application.



Absolute Maximum Ratings

DC Supply Voltage	6V
Total DC Supply Current	300 mA
RF Input Power	5 dBm
Operating Ambient Temperature	-40 °C to 85 °C
Storage Temperature	-60 °C to 150 °C
Maximum Junction Temperature (T _j max) °C	150 °C

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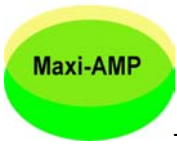
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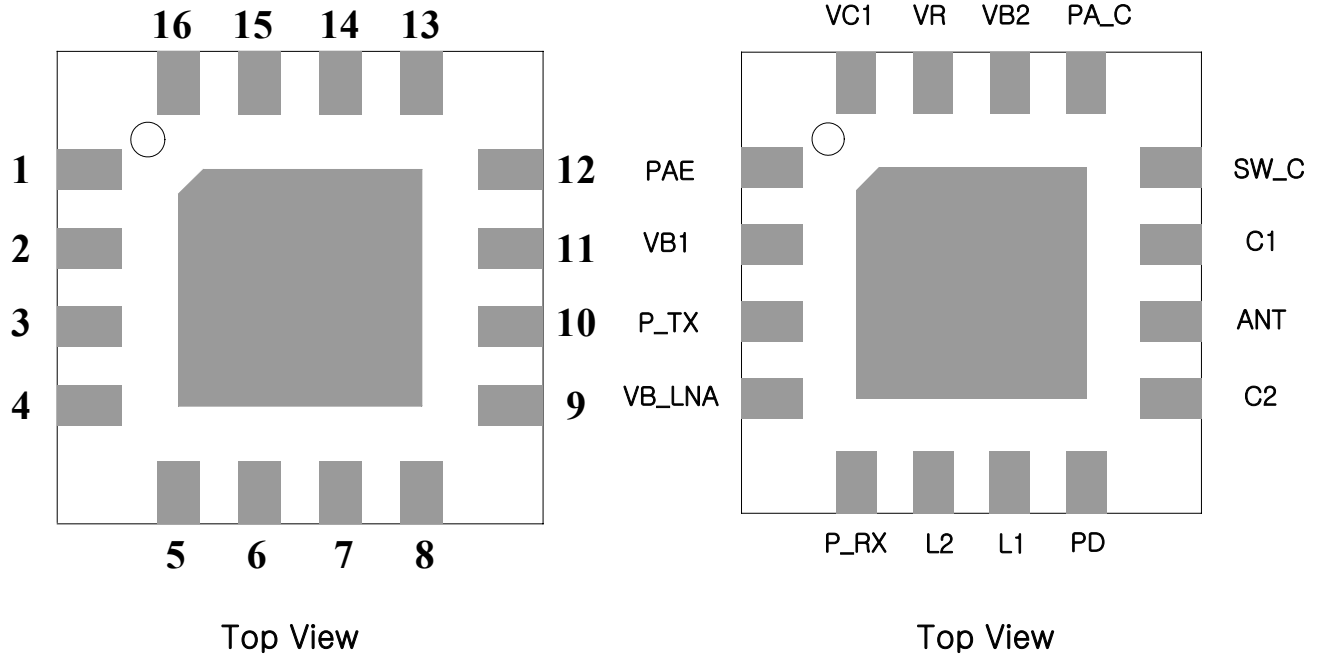
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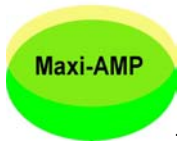
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Pin Assignment



Pin No.	Name	Function
1	PAE	Voltage input to control the on/off of PA.
2	VB1	Bias-voltage input for the 1 st -stage's base of PA.
3	P_TX	RF power input of PA.
4	VB_LNA	Bias-voltage input for the base of LNA.
5	P_RX	RF power output of LNA.
6	L2	Connection pin for inductor.
7	L1	Connection pin for inductor.
8	PD	Voltage output of power detector.
9	C2	Digital control voltage input of switch.
10	ANT	Connection pin to antenna.
11	C1	Digital control voltage input of switch.
12	SW_C	Connection pin for PA's output impedance match.
13	PA_C	Connection pin for PA's output impedance match.
14	VB2	Bias-voltage input for the 2 nd -stage's base of PA.
15	VC1	Bias-voltage input for the 1 st -stage's collector of PA.
16	VR	Reference voltage input.



Electrical Characteristics (Temperature=25°C)

Parameter of System	Symbol	Description	Min.	Typical	Max.	Units
Frequency Range	Freq		1.89	1.9	1.92	GHz
DC Supply Voltage	VC	VC1, VC2, VC_LNA in the application circuit.		3.3		V
Mode Control		TX: VC1='1', VC2='0'. RX: VC1='0', VC2='1'.				
Input Voltage of C1 or C2	VC1, VC2	'1' ranges from 2.2V to VC. '0' ranges 0V to 0.2V.	0		VC	V
Supply Current of C1 or C2	IC1, IC2				0.1	mA
Parameter of PA	Symbol	Description	Min.	Typical	Max.	Units
Supply Current	IVC	Total currents of VC1 and VC2. 21dBm output power at pin ANT.		140		mA
Supply Current	IVC	Total currents of VC1 and VC2. 18.5dBm output power at pin ANT.		110		mA
Quiescent Current	IQ	The input power of PA is off.		40		mA
Reference Voltage	VR	Regulated voltage input. This voltage level is adjustable.		2.8		V
Supply Current of VR	IVR				8	mA
PAE	VPAE	VPAE='1' in order to turn PA on.	0		VC	V
Supply Current of PAE	IPAЕ				1	mA
Bias Voltage	VB1, VB2	This voltage level is adjustable.		2.75		V
Bias Supply Current	IVB1, IVB2				0.5	mA
Power Gain	GPA	21dBm output power at pin ANT. From pin P_TX to pin ANT.		26.5		dB
P1dB	P1dB_P	This P1dB level can be adjusted to be higher.		22		dBm
2 nd Harmonics	2fo	21dBm output power at pin ANT.		-50		dBc
3 rd Harmonics	3fo	21dBm output power at pin ANT.		-40		dBc
Input Return Loss	STX	Small signal.		-11		dB
Power Detection	VPD	21dBm 15dBm 9dBm		0.5 0.01 0.002		V
Isolation		21dBm output power at pin ANT. From pin ANT to pin P_RX.		-45		dB
Parameter of LNA	Symbol	Description	Min.	Typical	Max.	Units
Frequency Range	Freq		1.884	1.9	1.92	GHz
Supply Current	IVC_LNA	Total currents of VC_LNA.		8		mA
Bias voltage	VB_LNA	This voltage level is adjustable.		2.75	VC	V
Bias Supply Current	IVB_LNA				0.1	mA
Power Gain	GLNA	From pin ANT to pin P_RX;		14		dB
Noise Figure	NF	From pin ANT to pin P_RX.		1.9		dB
P1dB	P1dB_L			2.2		dBm
Input Return Loss	SANT	Small signal.		-8		dB
Output Return Loss	SRX	Small signal.		-10		dB

* If not specified, all data are measured at 1.9 GHz.

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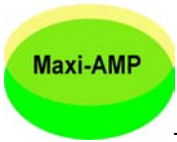
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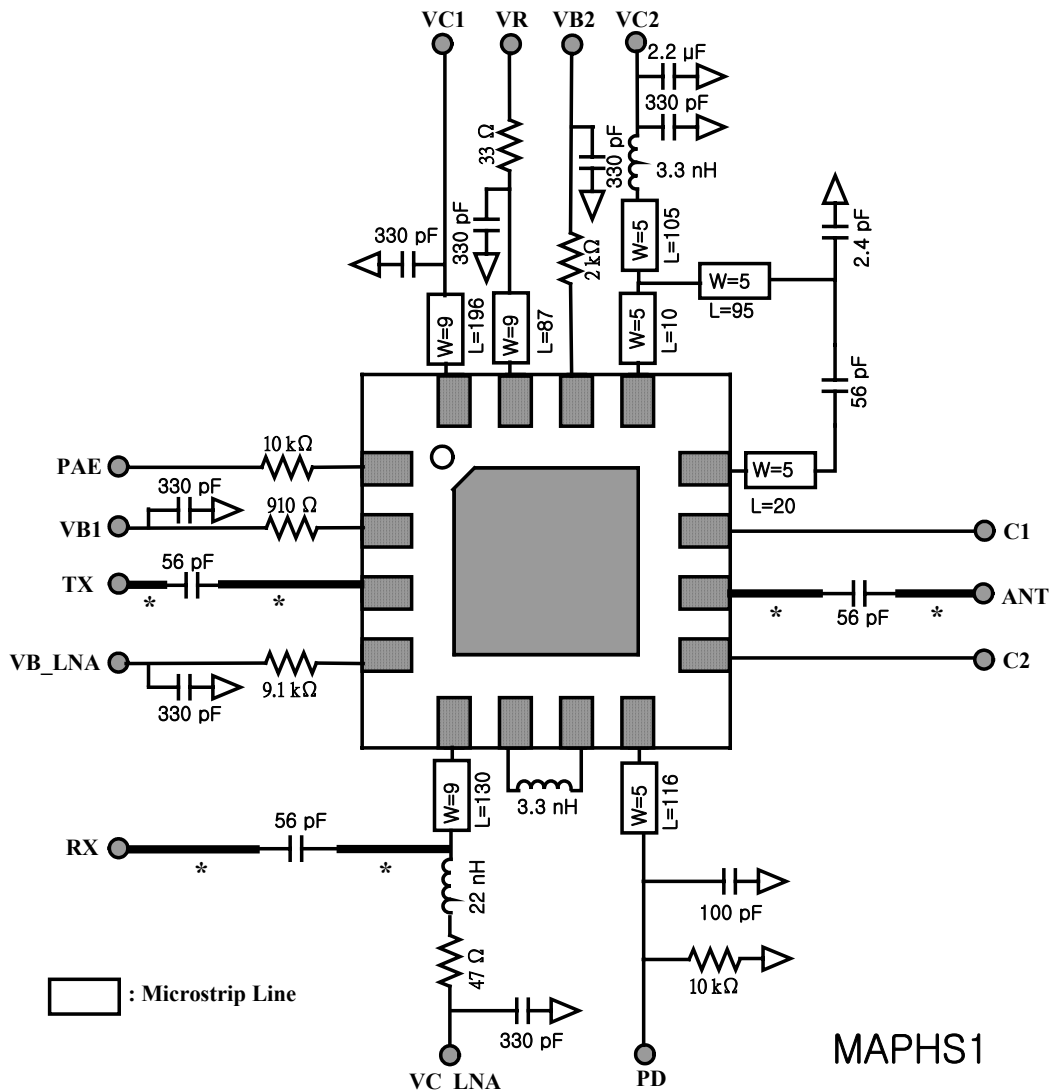
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Application Circuit



Note: (1) Unit of microstrip line is mil. (2) * indicates 50Ω microstrip line. (3) FR4 evaluation board is 15mil in height.

To control the on/off of LNA, apply 2.75V to port VB_LNA. The 2.75V can be adjusted to a different voltage level, for example 3V, by changing the value of the associated 9.1kΩ resistor, in case your system uses a different voltage level to control. There are two ways to control the on/off of PA. The first way is to maintain a regulated 2.75V to ports VB1 and VB2, and send “1” (digital high) to port PAE in order to turn PA on. Again, this 2.75V is adjustable by changing the values of the associated 910Ω and 2kΩ resistors. The other way to control PA is to maintain “1” to port PAE and send 2.75V to ports VB1 and VB2. Likewise, this 2.75V is adjustable.

The 9.1kΩ, 910Ω, and 2kΩ resistors, which are associated with VB_LNA, VB1, and VB2 respectively, are intended for the system of using 2.75V control signals for turning PA or LNA on as well as the regulated 2.8V being applied to VR. Both 2.75V and 2.8V voltage levels can be changed in case your system offers a different voltage level for regulated voltage supply or for digital high signal. You may contact Maxi-AMP for the proper resistor’s values.

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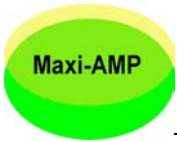
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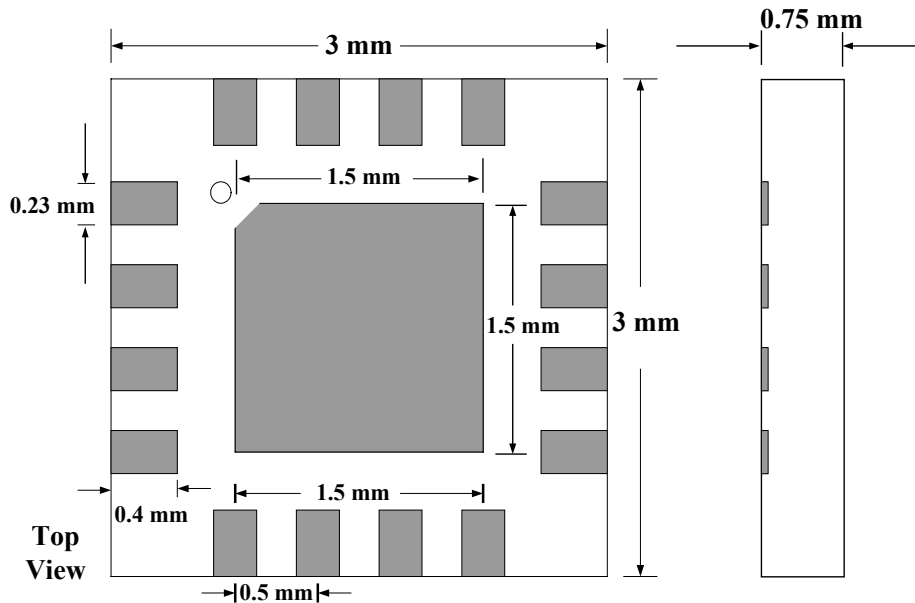
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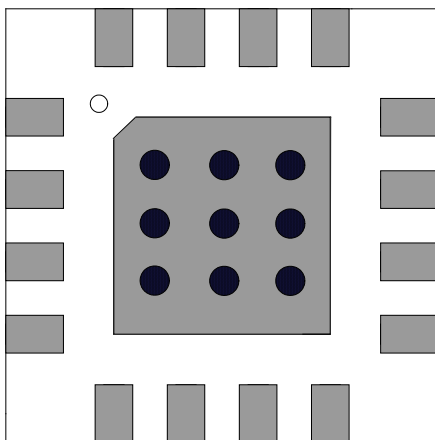
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Dimensions of Package

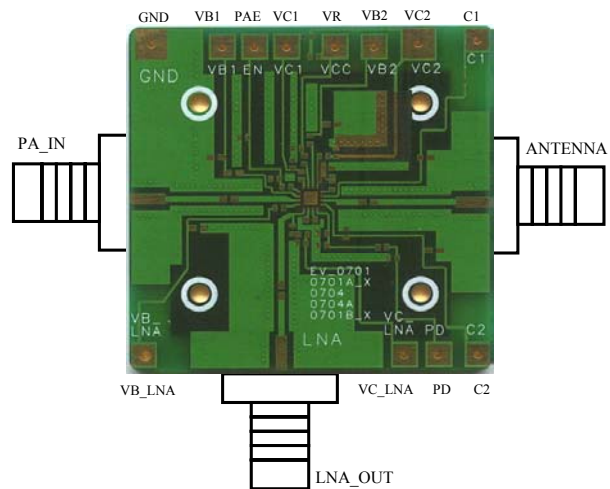


Land Pattern

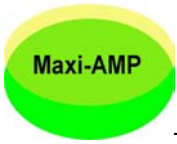


Top View

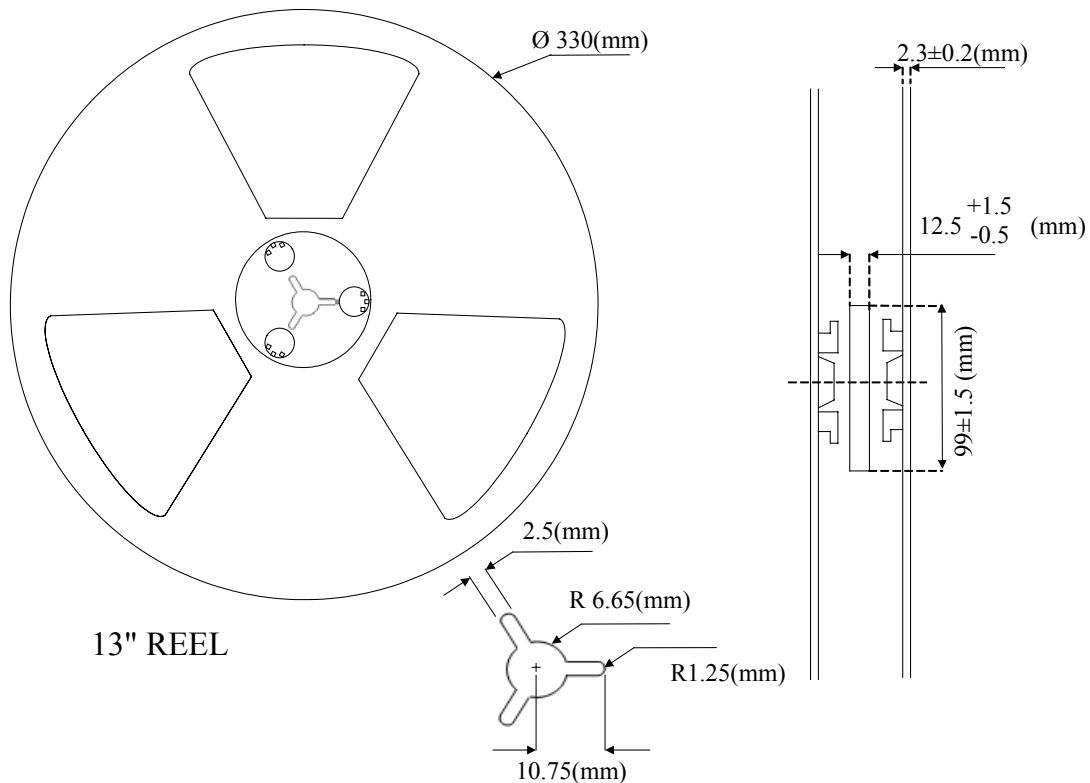
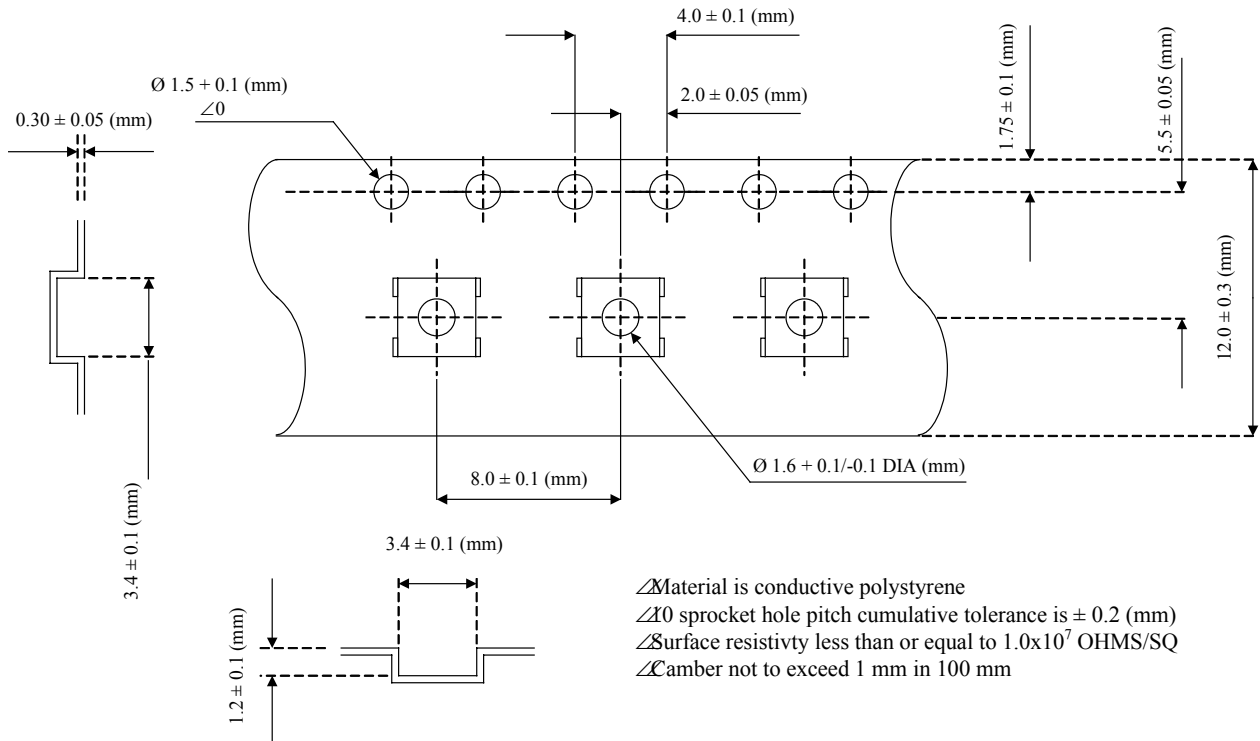
Evaluation Board



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Carrier Tape



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