

## DESCRIPTION

The RTC6691 silicon-germanium (SiGe) power amplifier (PA) is designed to operate in 2.4GHz ISM band, compatible with 802.11b/g wireless LAN system with high power, high gain. The Amplifier consists of 3 gain stages with inter-stage matching, build-in input matching network, and a power detector for close loop power control operation. In 802.11g mode (OFDM 64QAM, 54Mbps), it provides a low EVM (Error-Vector magnitude) of 3% at +21.5dBm linear output power. The device is packaged in a tiny industry-standard 16-lead surface mount package QFN16 3x3.

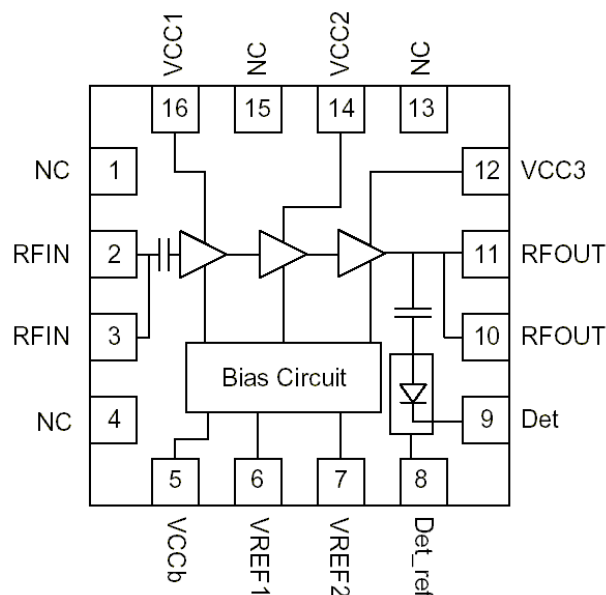
## FEATURE

- ◆ 3.3V Power Supply
- ◆ Maximum Linear Output Power for 11g usage : +21.5 dBm ( 54Mbps OFDM 64 QAM )
- ◆ Maximum Linear Output Power for 11b usage : +26 dBm ( 11Mbps CCK )
- ◆ Small signal gain : 33.5dB
- ◆ On-chip input matching
- ◆ Operation ambient temperature: -40 ~ +85 °C
- ◆ Lead-free RoHS compliant

## APPLICATION

- ◆ High Power WLAN applications
- ◆ IEEE 802.11b/g Wireless LAN System
- ◆ 2.4GHz ISM Band Application
- ◆ 2.4GHz Cordless Phones

## PINOUT (top view)



**PIN FUNCTION DESCRIPTION**

Pin	Function	Description
1	NC	Not connected
2	RFin	RF input. Input matching network is built on chip.
3	RFin	Same as pin 2
4	NC	Not connected
5	Vccb	Power supply for bias circuit, typically 3.3V
6	Vref1	Bias Control voltage 1. typically 2.9V. Pin 6,7 can be used to control PA on/off.
7	Vref2	Bias Control voltage 2. typically 2.9V. Pin 6,7 can be used to control PA on/off.
8	Det_ref	Power detector enable. typically 3V.
9	Det	Detector output voltage for output power index
10	RFout	RF output.
11	RFout	Same as pin 10
12	Vcc3	Power supply for power stage-3, typically 3.3V
13	NC	Not connected
14	Vcc2	Power supply for power stage-2, typically 3.3V
15	NC	Not connected
16	Vcc1	Power supply for power stage-1, typically 3.3V

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	RATING	UNITS
Supply Voltage	-0.5 to +5.0	V
Reference Voltage(Vref)	0.0 to +4.0	V
Input RF Level	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

**DC ELECTRICAL CHARACTERISTICS**

T=25°C, Vcc=3.3v, Freq=2.45GHz

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Supply Voltages					
Vcc1		3.0	3.3	4.2	Volts
Vcc2		3.0	3.3	4.2	Volts
Vcc3		3.0	3.3	4.2	Volts
Vref1			2.9		Volts
Vref2			2.9		Volts
Supply Currents					
Icc1 + Icc2 + Icc3 (for 802.11g usage)	Pout= 21.5 dBm		240		mA

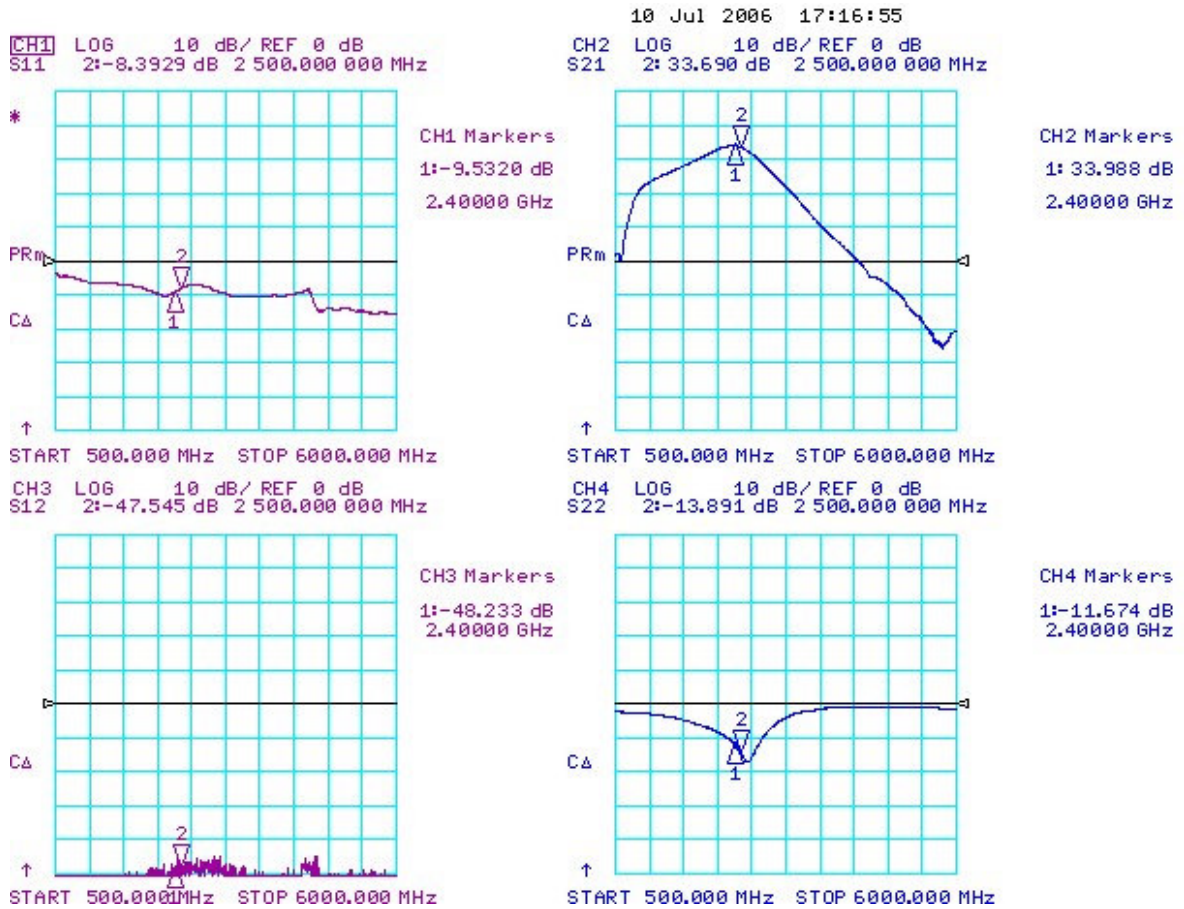
Icc1 + Icc2 + Icc3 (for 802.11b usage)	Pout = 26 dBm		360		mA
Ioff	Standby current		0.05		uA
Iref1	Quiescent (no RF)		1.2		mA
Iref2	Quiescent (no RF)		2.0		mA
Vpd	Pout=22 dBm		1.09		V
PDR	Power detector range	0		25	dBm

## AC ELECTRICAL CHARACTERISTICS

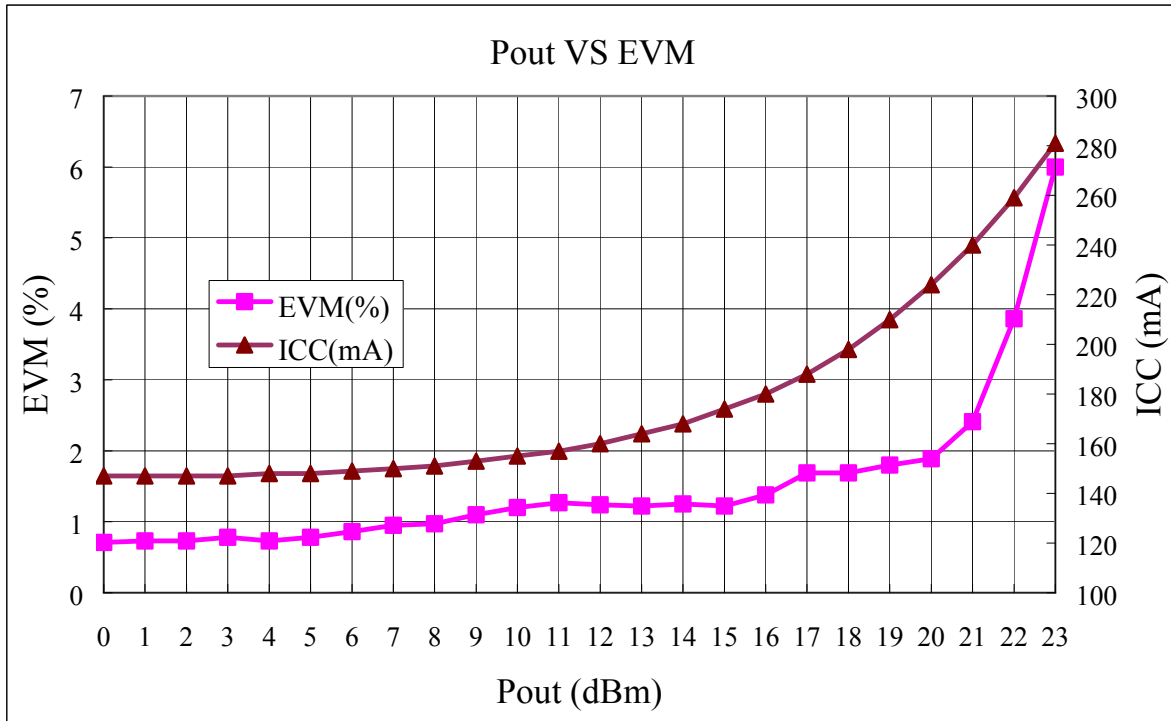
T=25°C, Vcc=3.3V, Freq=2.45GHz

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Frequency Range		2.4	2.45	2.5	GHz
Saturated Output Power			29		dBm
Linear efficiency	Measured @ P1dB		36.3		%
Small Signal Gain	Pin=-30dBm		33.5		dB
Input VSWR	Pin=-30 dBm		2:1		
Linear Pout for 11g usage	802.11g OFDM 64 QAM EVM = 3%		21.5		dBm
Pout for 11g Spectral mask	802.11g OFDM 64 QAM		23.5		dBm
Linear Pout for 11b usage	Pass 802.11b CCK Spectral mask		26		dBm
Gain Flatness	within band(2.4~2.5GHz)		+/-0.1		dB
Input return loss				-8	dB
Output return loss				-11	dB
2f, 3f, 4f harmonics	CW signal, Pout = 21.5 dBm			-40	dBc
t <sub>on</sub> (ramp-on time)	Rise time for 10% to 90% Pout		<100		ns

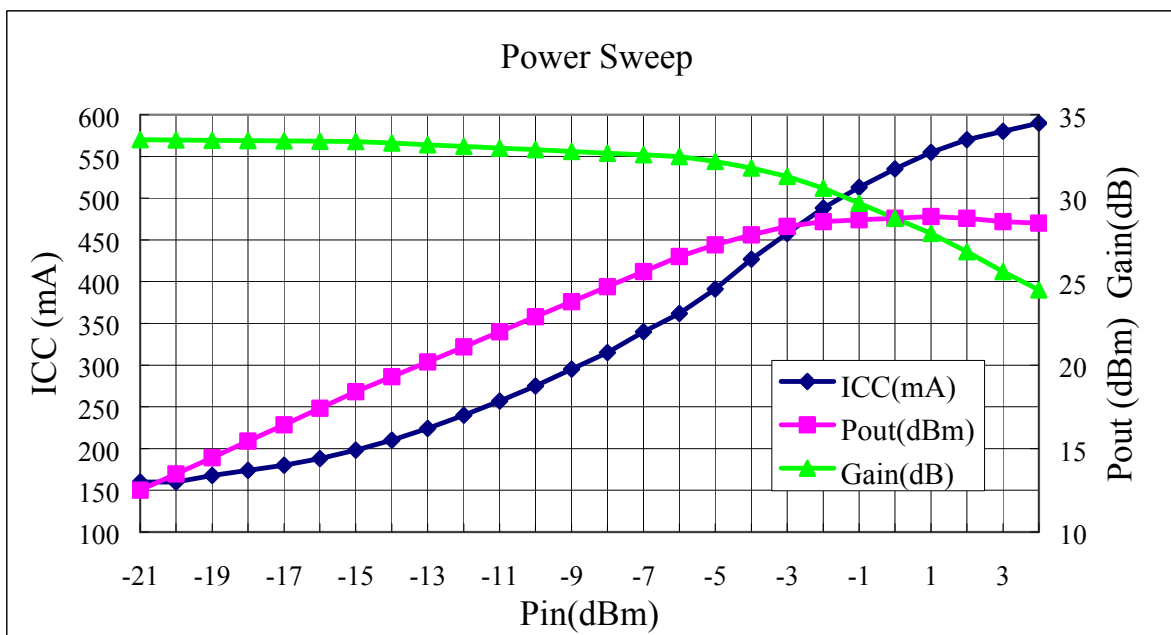
## S-PARAMETER



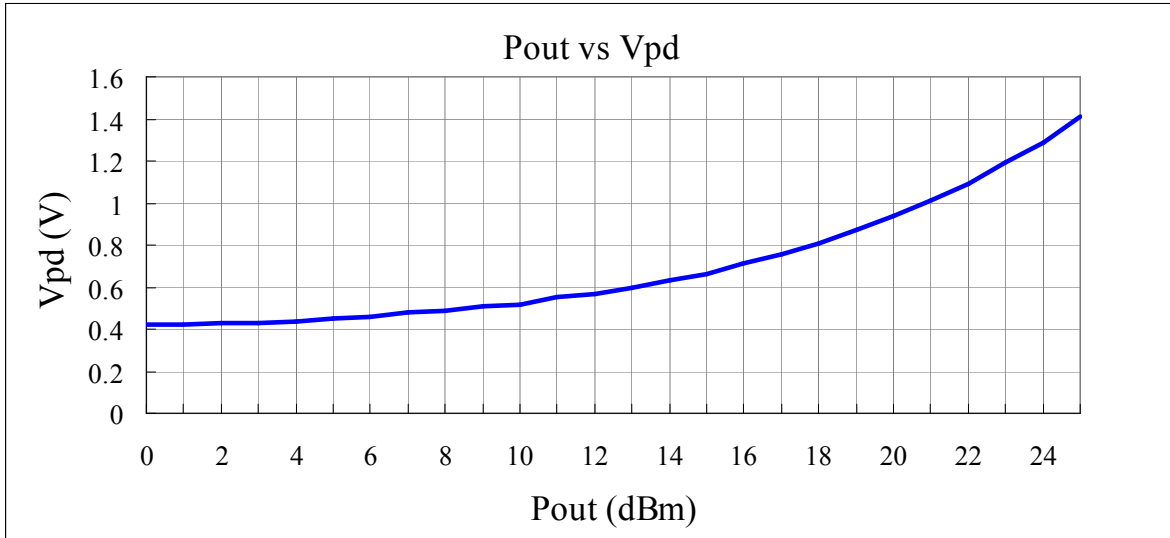
## EVM and Current Consumption



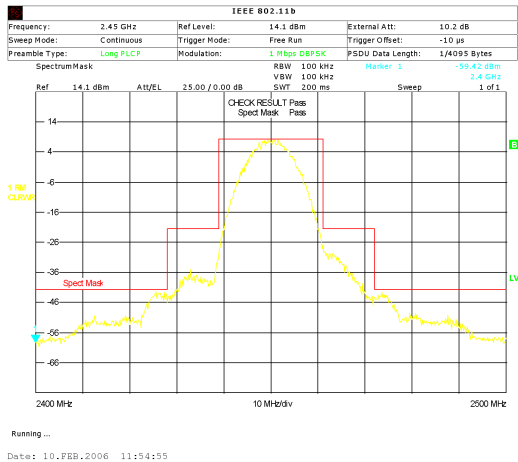
## P1dB and Psat



## Power Detector

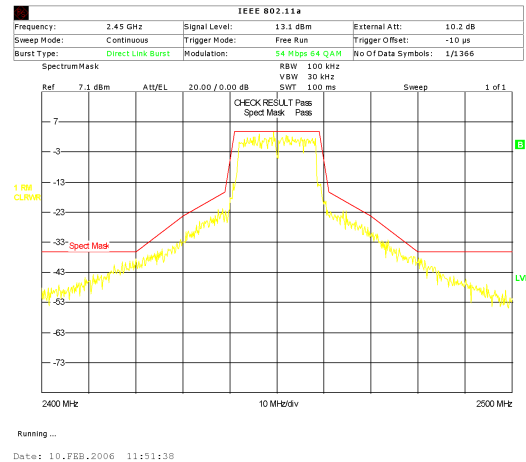


### 802.11b Spectral Mask (11Mbps CCK)



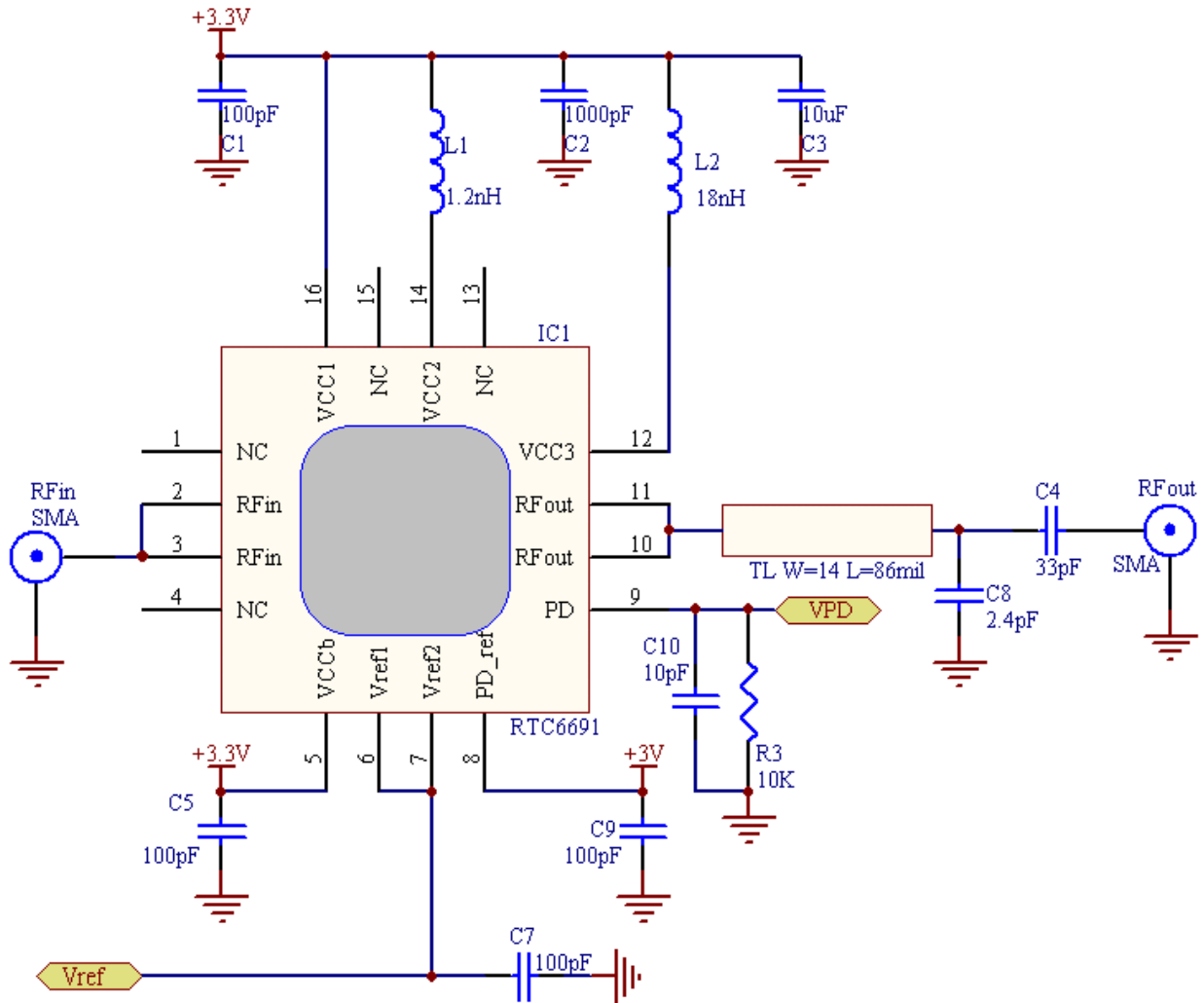
**Pout = 26 dBm**

### 802.11g Spectral Mask (54Mbps OFDM)

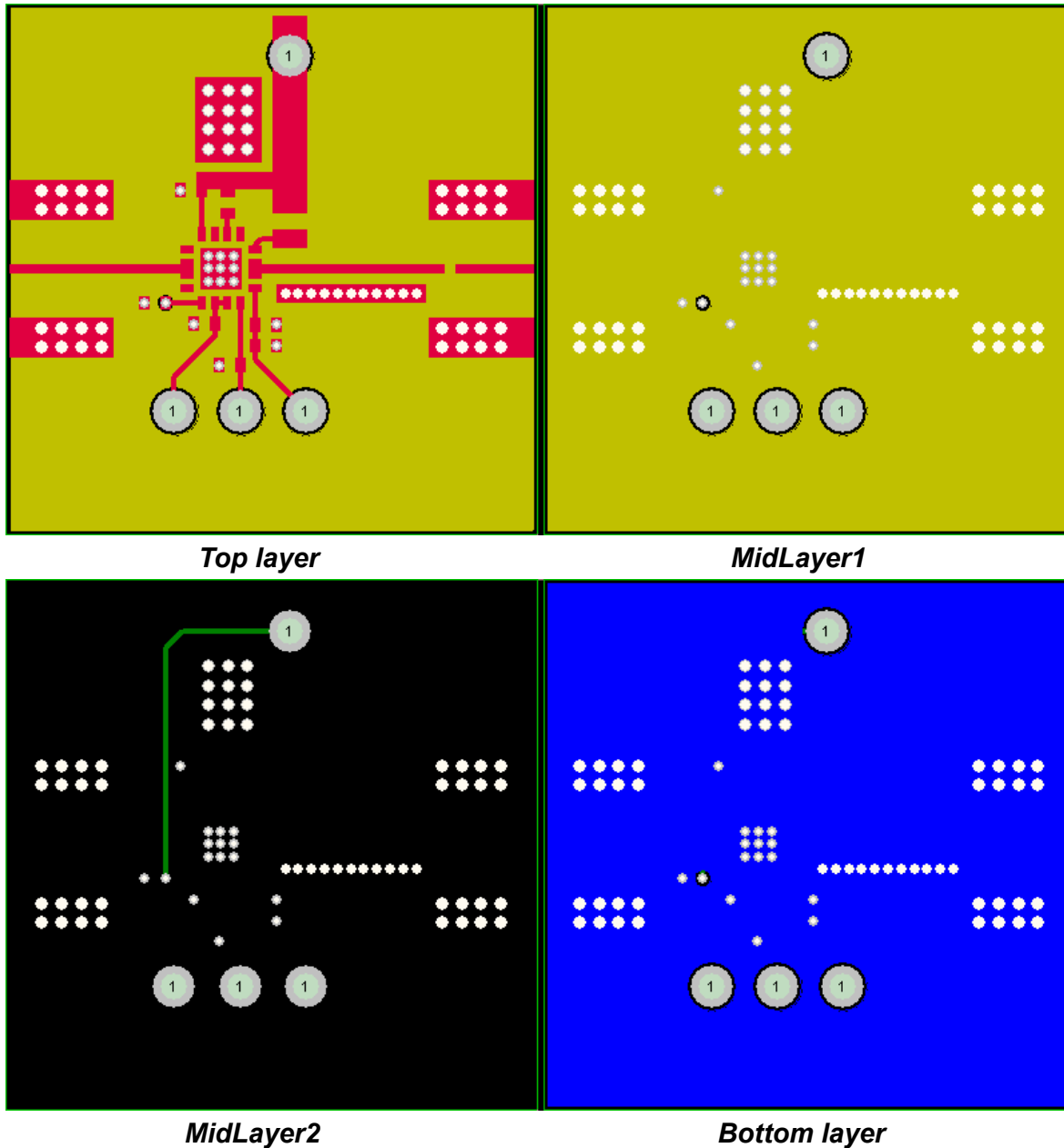


**Pout = 23.5 dBm**

## EVALUATION BOARD SCHEMATIC



**EVB LAYOUT :**

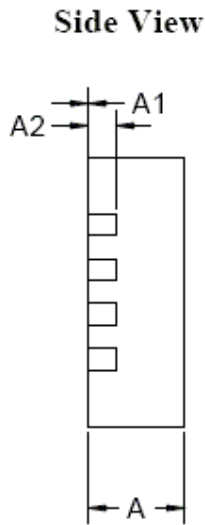
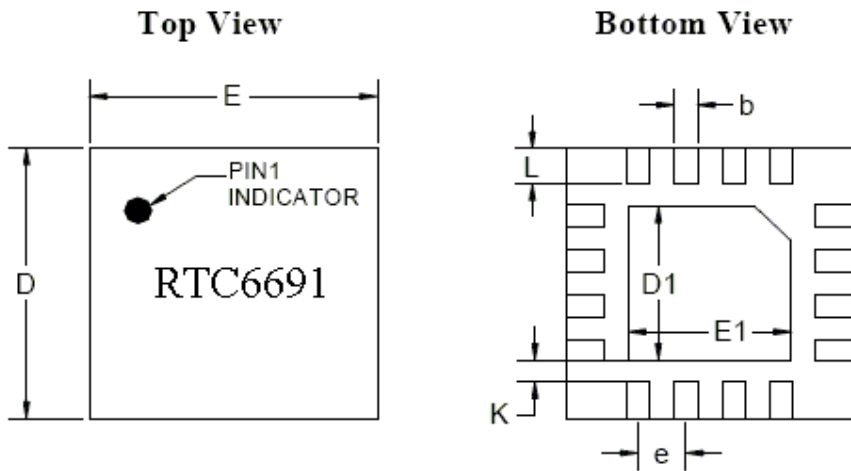


- Note :
1. Vcc1, Vcc2, Vcc3 and Vccb are connected together and applied to 3.3V.  
Vref1 and Vref2 can be connected together and applied to the other 2.9V.
  2. The evaluation board is 4-layer PCB using FR4 material. The thickness between top layer and Midlayer1 (GND) is 8 mil. If the PCB thickness is changed, 50Ω transmission line dimension needs to be re-calculated.



**PACKAGE :**

**Quad Flat No-Lead Plastic Package ( QFN16 3x3 )**



Dim	Dimension in mm		
	Max	Nom	Min
A	1.000	0.900	—
A1	0.050	0.010	0.000
A2	0.300 BSC		
D	3.100	3.000	2.900
E	3.100	3.000	2.900
D1	1.800	1.650	1.500
E1	1.800	1.650	1.500
b	0.300	0.240	0.190
e	0.500 BSC		
K	0.250 BSC		
L	0.450	0.400	0.350