5GHz 18dBm Power Amplifier for 802.11ac

DESCRIPTION

The RTC6659E is a power amplifier (PA) designed for 4.9~5.9GHz frequency range, compatible with 802.11a/802.11ac wireless LAN system. The device is manufactured based on advanced InGaP/GaAs HBT (Hetero-junction Bipolar Transistor) process. 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. With single supply voltage 5V, it provides a low EVM (Error-Vector magnitude) of 3% at +22dBm linear output power In 802.11a mode (OFDM 64QAM, 54Mbps) and 15dBm linear output power under 1.8% EVM 802.11ac 256QAM modulation. The device is provided in a tiny industry standard 16-lead surface mount package QFN 3mmX3mm.

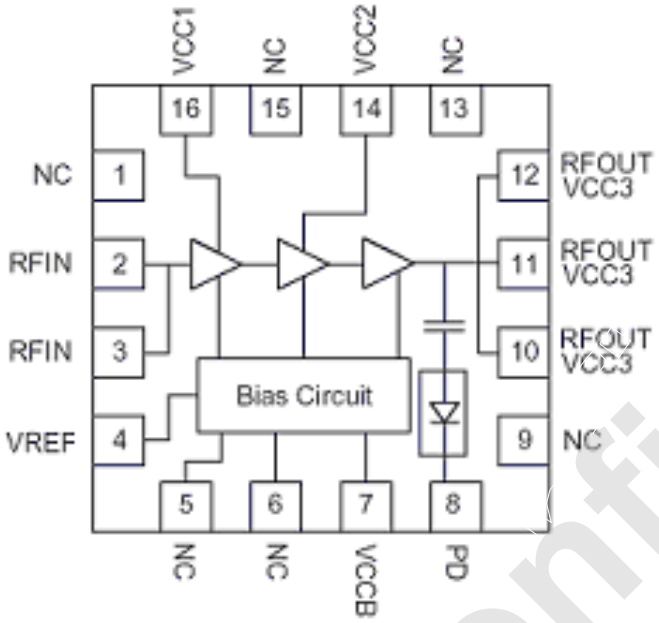
FEATURE

- 4.9 ~5.9GHz Frequency Range
- 5V Single Supply Voltage
- RTC6659 pin Compatible
- 22dBm@3% EVM, 802.11a, 64QAM
- 18dBm@1.8% EVM, 802.11ac, 256QAM
- Small Signal Gain : 32 dB
- On-chip Input Matching
- QFN 3mmX3mm 16 Lead Package
- RoHS / Halogen Free Compliant
- Moisture Sensitivity Level : MSL-3

APPLICATION

- High Power WLAN applications
- IEEE 802.11a/802.11ac Wireless LAN System
- 5GHz ISM Band Application
- 5GHz Cordless Phones

PIN OUT(top view)



PIN FUNCTION DESCRIPTION

PIN	FUNCTION	DESCRIPTION
1,5,6,9,13,15	NC	Not connected
2,3	RFIN	RF input. Input matching network is built on chip.
4	VREF	Bias Control voltage of power stage-1,2,3. This pin can be used to control PA on/off.
7	VCCB	Power supply for bias circuit
8	PD	Detector output voltage for output power index
10,11,12	RFOUT/VCC3	RF output & Power supply for power stage-3
14	VCC2	Power supply for power stage-2
16	VCC1	Power supply for power stage-1

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNITS
Supply Voltage	-0.5 to +5.5	V
Reference Voltage(Vref)	0.0 to +3.0	V
Input RF Level	+5	dBm
Operating Ambient Temperature	-40 to +85	℃
Storage Temperature	-40 to +150	℃

Notes : (1) ESD sensitive device, handle with care. (2) All voltage are with respective to ground.

Exceeding these ranges might cause damage to the device

DC ELECTRICAL CHRACTERISTICS

T=25℃, Vcc=Vccb=5V, Freq=5.5GHz

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Supply Voltages					
Vcc1/Vcc2/Vcc3		3	5	5.25	Volts
Vccb		3	5	5.25	Volts
Vref		2.85	2.9	2.95	Volts
Supply Currents					
Icc1 + Icc2 + Icc3 (for 802.11a usage)	Quiescent (No RF) Pout= 22 dBm		285 325		mA
Icc1 + Icc2 + Icc3 (for 802.11ac usage)	Quiescent (No RF) Pout= 18 dBm		285 310		mA
Iref	Quiescent (no RF) Pout=22 dBm		4 5		mA

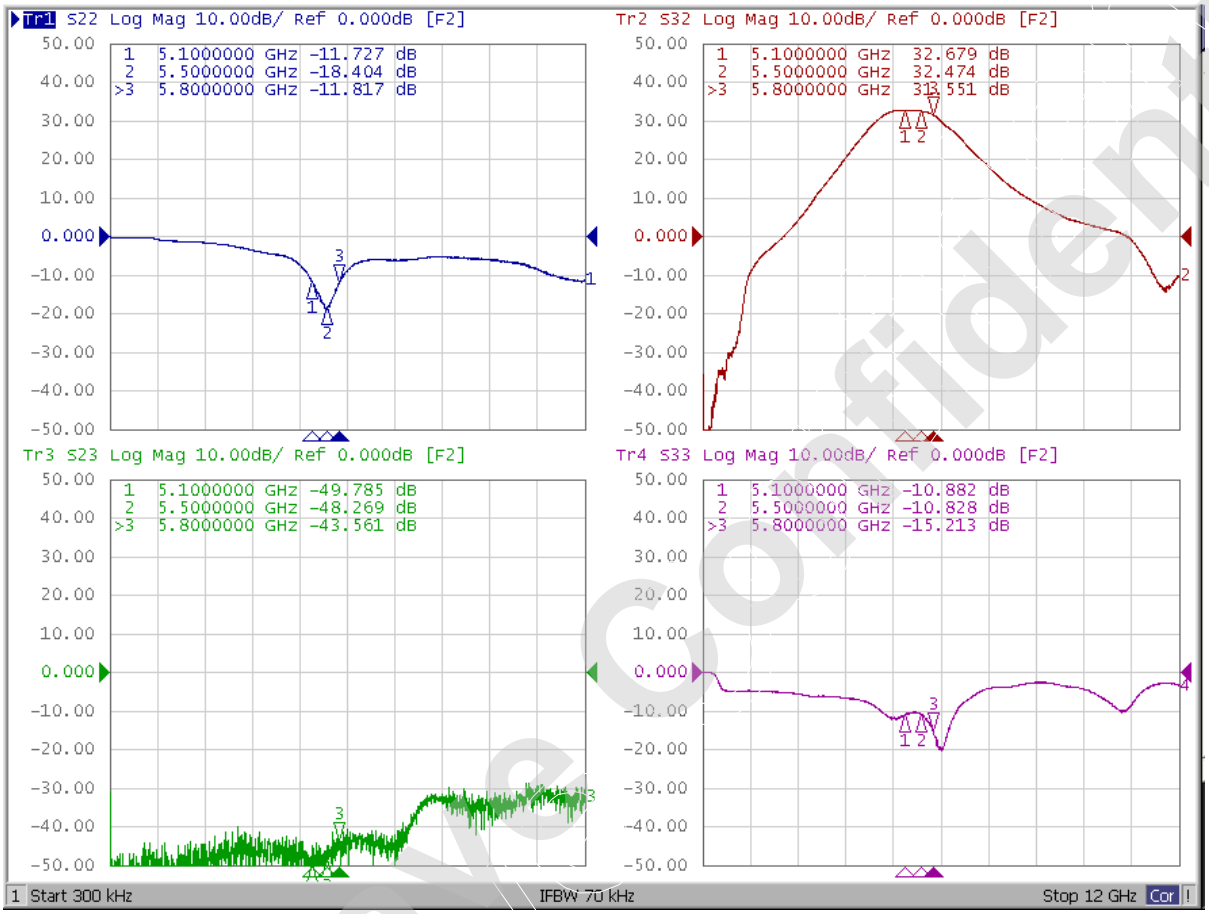
AC ELECTRICAL CHRACTERISTICS

T=25℃, Vcc=Vccb=5V, Freq=5.5GHz, Vref=2.9V

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Frequency Range		4.9		5.9	GHz
Small Signal Gain	P_{in}=-30 dBm	31.5	32	32.5	dB
P1dB	1dB Gain compression		27		dBm
Linear Pout for 11a usage	64QAM/54Mbps EVM = 3%	21.5	22	22.5	dBm
11a mask compliant power	OFDM 6Mbps		26		dBm
Linear Pout for 11ac usage	MCS9, EVM=1.8%, HT80		18		dBm
Gain Flatness	within band(4.9~5.9GHz)		+/-0.5		dB
Input return loss				-10	dB
Output return loss				-10	dB
2f, 3f, harmonics	CW, Pout = 22 dBm		-40		dBc

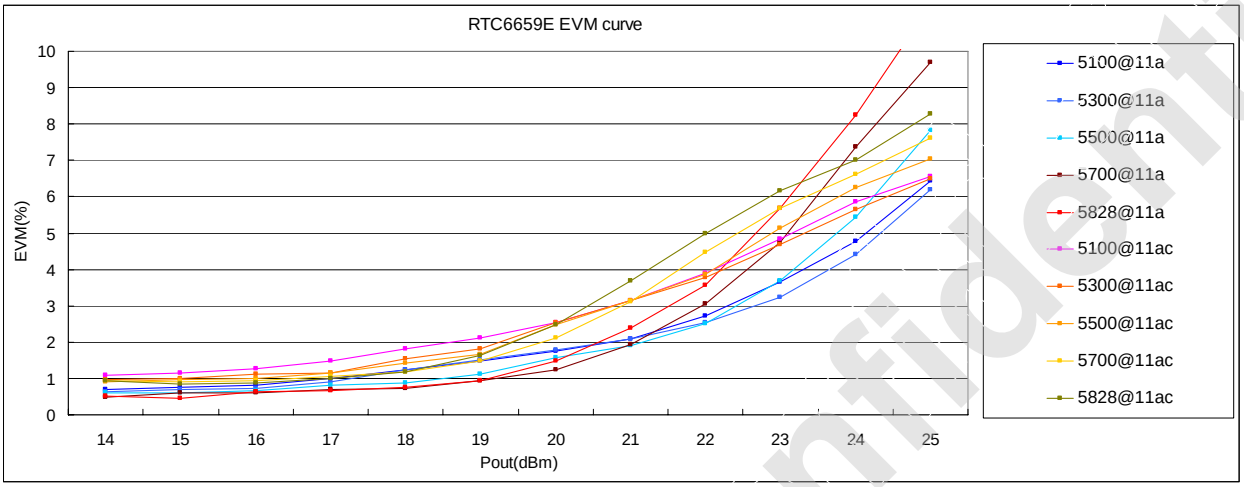
S-PARAMETER

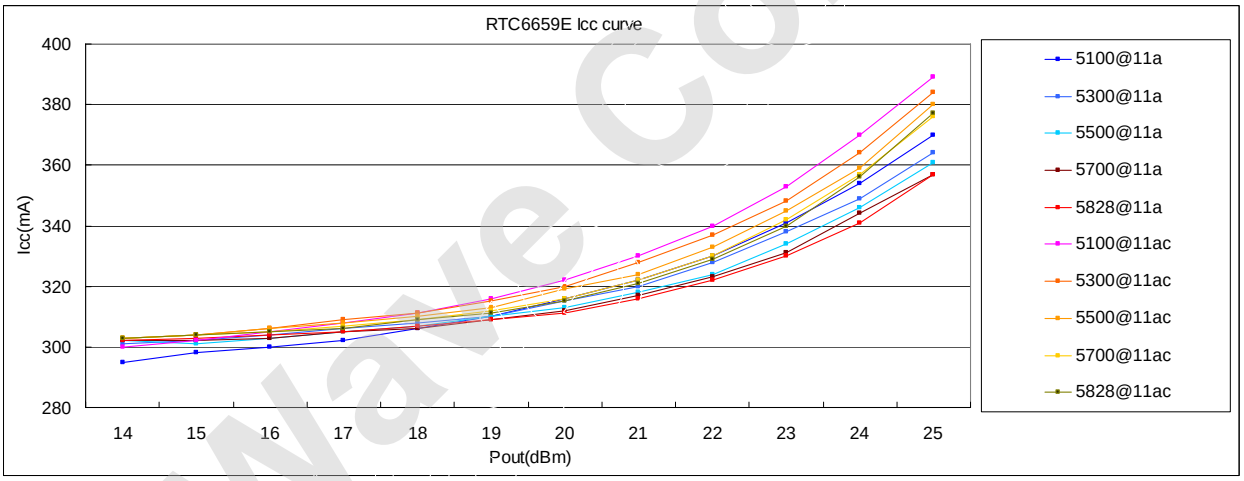
T=25℃, Vcc=Vccb=5V, Vref=2.9V

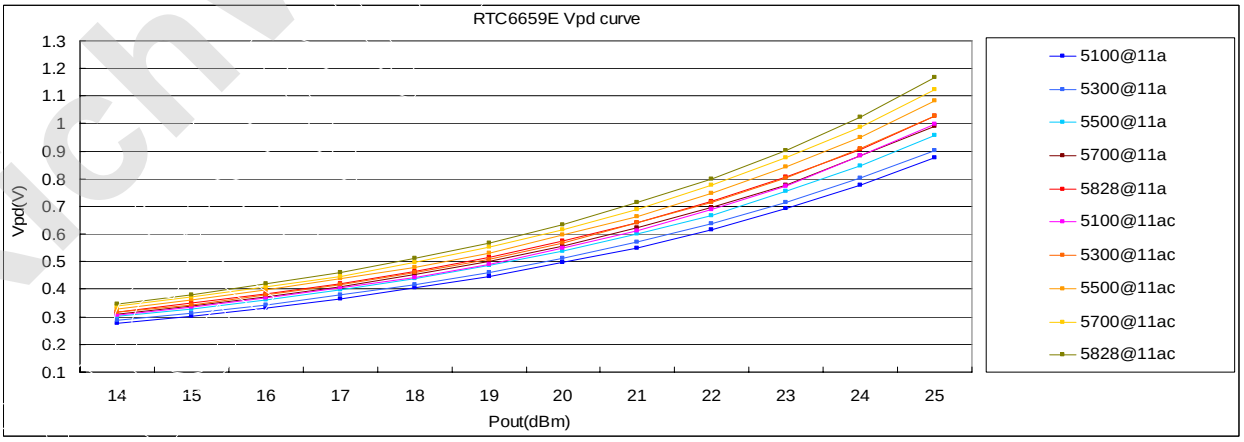


EVM & Icc at 802.11a 64QAM 54Mbps/802.11ac 256QAM

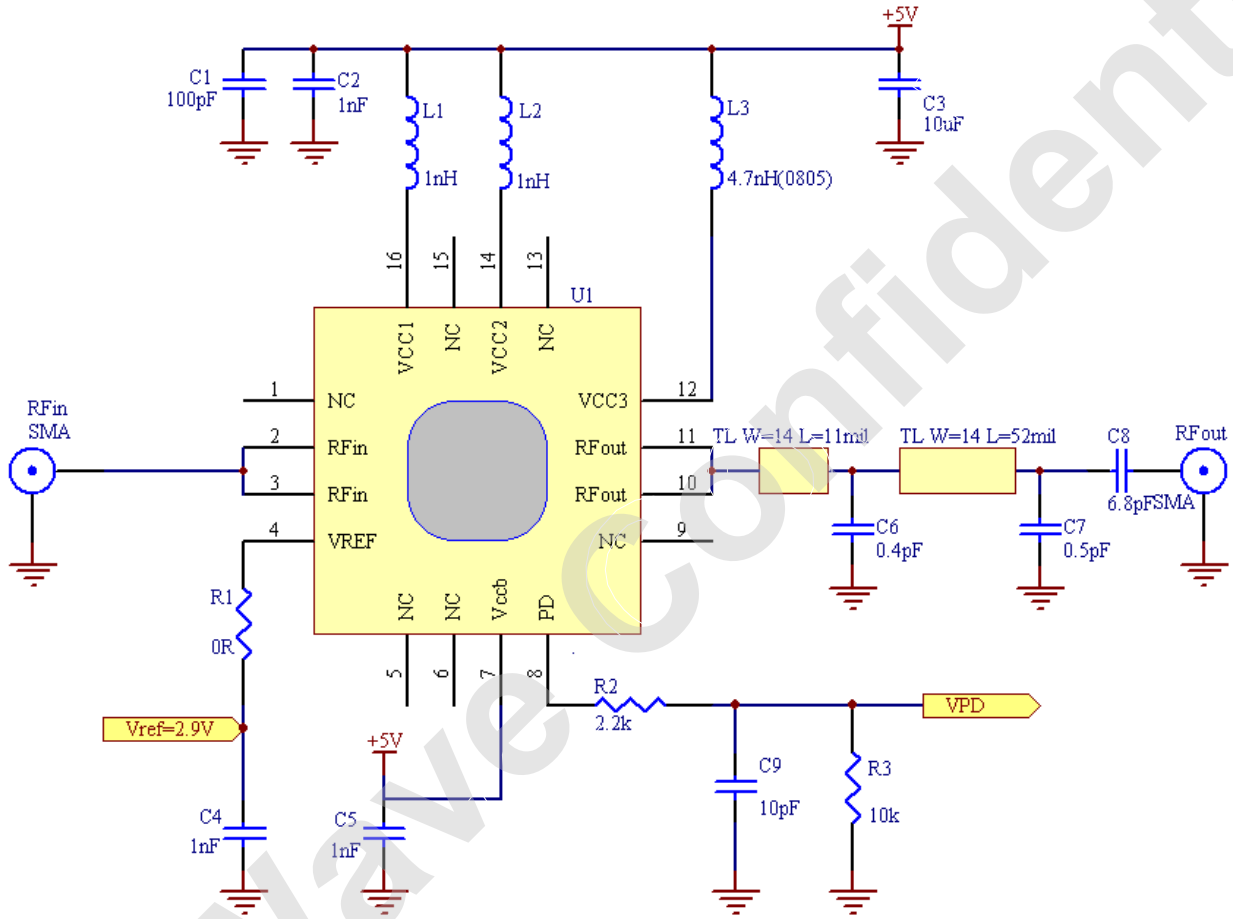
T=25℃, Vcc=Vccb=5V, Vref=2.9V





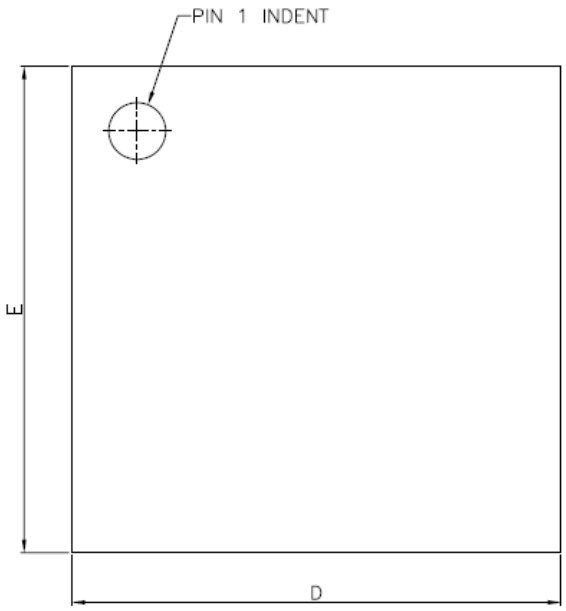


APPLICATION CIRCUIT



PACKAGE :

16L QFN 3mmX3mmX0.9mm



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
b	0.18	0.25	0.30
C	——	0.20 REF.	——
D	2.90	3.00	3.10
D2	1.65	1.70	1.75
E	2.90	3.00	3.10
E2	1.65	1.70	1.75
e	——	0.50	——
L	0.35	0.40	0.45
y	0.00	——	0.075