## DESCRIPTION

The RTC6670 power amplifier (PA) is designed to operate in 5GHz ISM band, compatible with 802.11a 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 802.11a mode (OFDM 64QAM, 54Mbps), it provides a low EVM (Error Vector Magnitude) of 3% at +18dBm linear output power. The device is packaged in a tiny industry-standard 16-lead surface mount package QFN16 3x3.

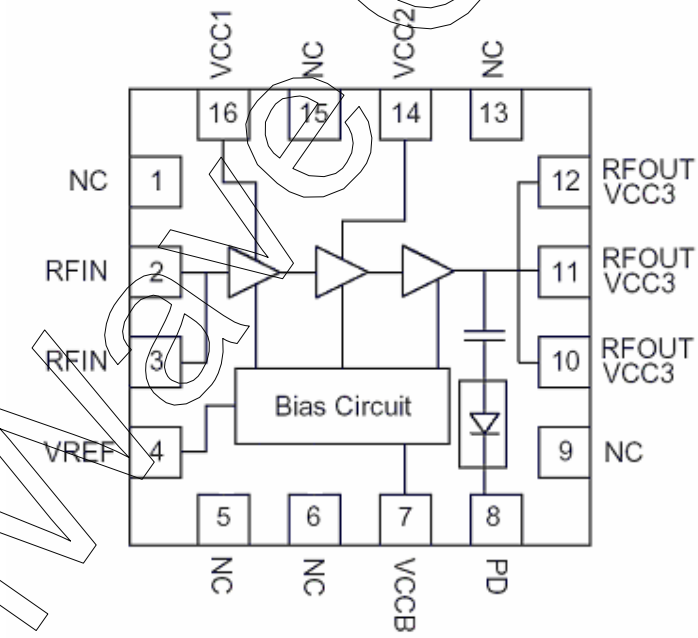
## FEATURE

- 3.3V Power Supply
- Maximum Linear Output Power for 11a usage : +18 dBm ( 54Mbps OFDM 64 QAM )
- Small signal gain : 29dB
- On-chip input matching
- Lead(Pb)-free, RoHS compliant packaging

## APPLICATION

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

## PINOUT (top view)



### *PIN FUNCTION DESCRIPTION*

| PIN | FUNCTION | DESCRIPTION |
|---|---|---|
| 1,5,6,9,13,15 | NC | Not connected |
| 2 | RFIN | RF input. Input matching network is built on chip. |
| 3 | RFIN | Same as pin 2 |
| 4 | VREF | Bias Control voltage of power stage-1,2 & 3.<br>This pin can be used to control PA on/off. |
| 7 | VCCB | Power supply for bias circuit, typically 3.3V |
| 8 | PD | Detector output voltage for output power index |
| 10,11,12 | RFOUT/VCC3 | RF output &<br>Power supply for power stage-3, typically 3.3V |
| 14 | VCC2 | Power supply for power stage-2, typically 3.3V |
| 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 | +5 | dBm |
| Operating Ambient Temperature | -40 to +85 | ℃ |
| Storage Temperature | -40 to +150 | ℃ |

※**Caution !** ESD Sensitive Device

## DC ELECTRICAL CHRACTERISTICS

T=25℃, Vcc=3.3V, Vref=2.9V

| 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 |
| VREF | | 2.8 | 2.9 | 3.0 | Volts |
| Supply Currents | | | | | |
| Icc1 + Icc2 + Icc3<br>(for 802.11a usage) | Quiescent (no RF)<br>Pout= 18 dBm | | 110<br>160 | | mA |
| Ioff | Standby current | | 0.05 | | uA |
| Iref | Quiescent (no RF) | | 4 | | mA |

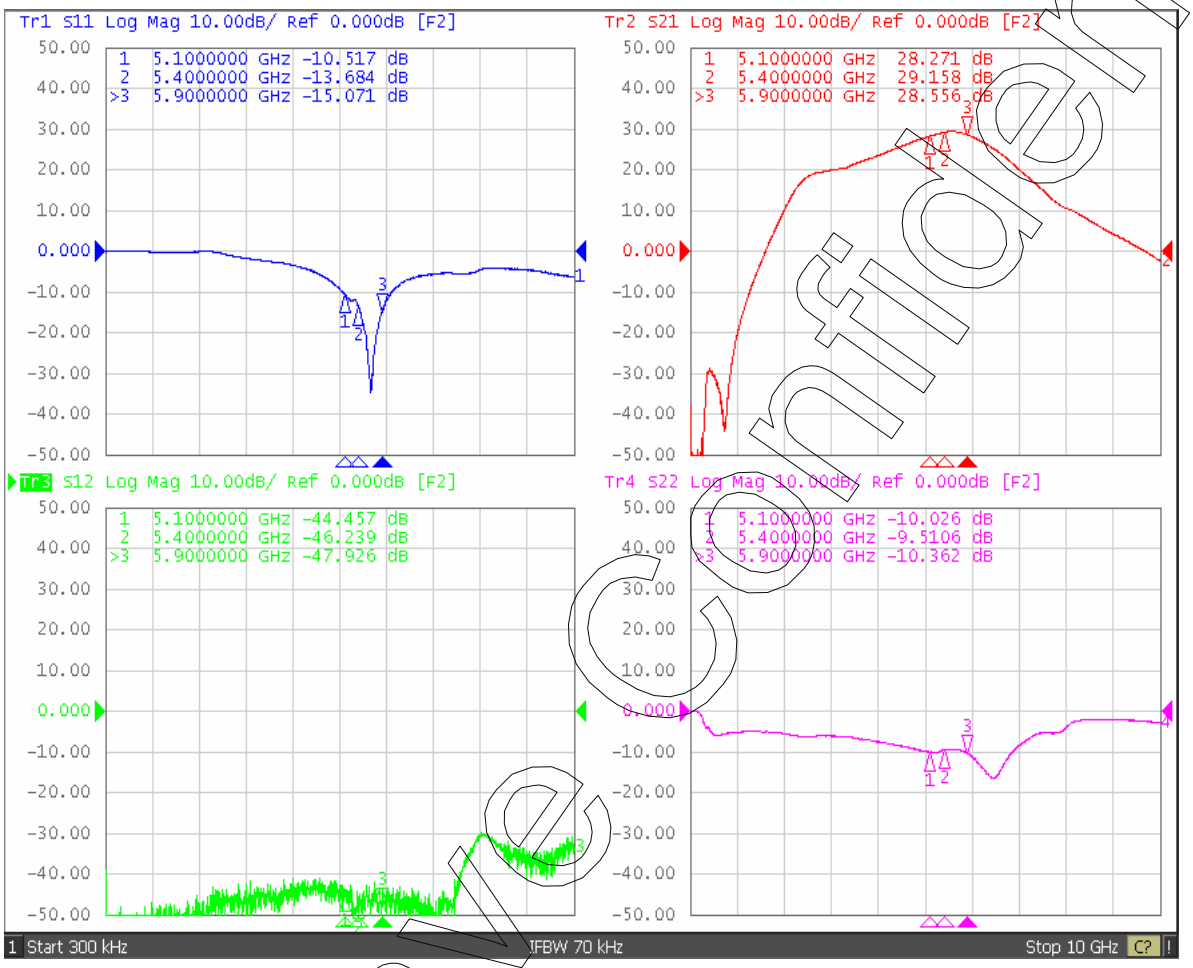
## AC ELECTRICAL CHRACTERISTICS

T=25℃, Vcc=3.3V, Vref=2.9V

| PARAMETER | CONDITION | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| Frequency Range | | 4.9 | 5.4 | 5.9 | GHz |
| Small Signal Gain | Pin= -20dBm | | 29 | | dB |
| P1dB | 1dB Gain compression | | 26 | | dBm |
| Linear Pout for 11a usage | 802.11a OFDM 64 QAM EVM = 3% | | 18 | | dBm |
| Pout for 11a Spectral mask | 802.11a OFDM 64 QAM | | 22 | | dBm |
| Gain Flatness | within band(4.9~5.9GHz) | -0.5 | | 0.5 | dB |
| Input return loss | | | -10 | | dB |
| Output return loss | | | -10 | | dB |
| 2f, 3f, 4f harmonics | CW signal, Pout = 18 dBm | | | -30 | dBc |
| $t_{on}$ (ramp-on time) | Rise time for 10% to 90% Pout | | <100 | | ns |

## S-PARAMETER

T=25℃, Vcc=3.3V, Vref=2.9V



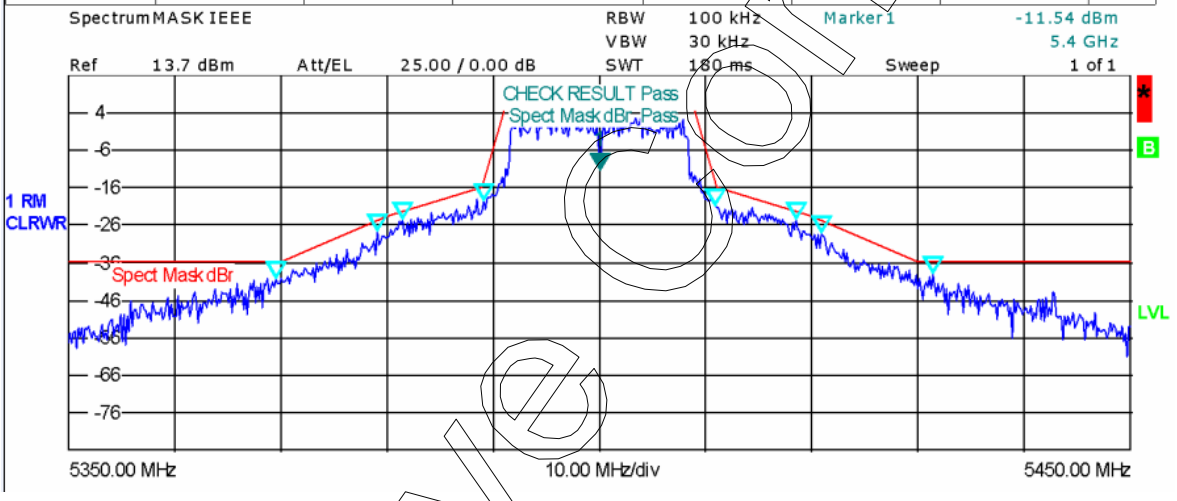
### *802.11a Spectral Mask (54Mbps OFDM) at Pout = 22 dBm*

IEEE 802.11a

| | | | | | |
|---|---|---|---|---|---|
| Frequency: | 5.4 GHz | Signal Level Setting: | 19.7 dBm | External Att: | 0.5 dB |
| Sweep Mode: | Continuous | Trigger Mode: | Free Run | Trigger Offset: | -10 µs |
| Burst Type: | Direct Link Burst | Modulation: | 54 Mbps 64 QAM | No Of Data Symbols: | 1/1366 |

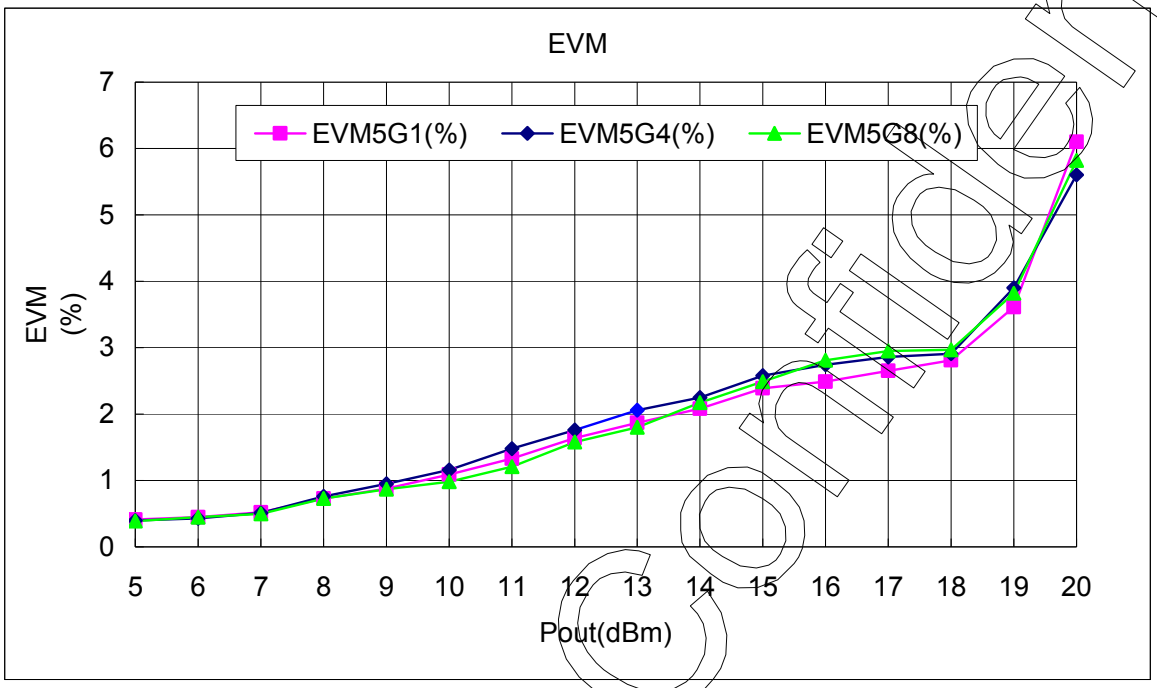
Spectrum Emission Mask

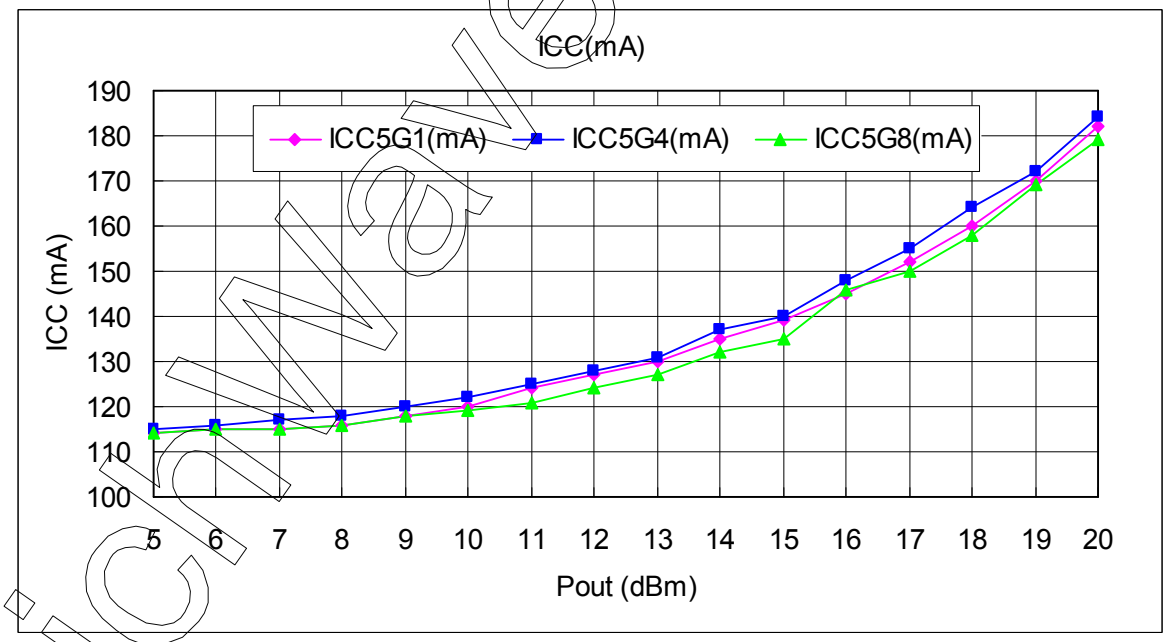
| Tx Channel: | Bandwidth | 18 MHz | Reference Power | 4.29 dBm | | |
|---|---|---|---|---|---|---|
| Start Freq Rel. | Stop Freq Rel. | RBW | Freq at Δ to Limit | Pwr Abs. | Pwr Rel. | Δ to Limit |
| -50.000 MHz | -30.000 MHz | 100 kHz | 5.369551282 GHz | -40.22 dBm | -44.50 dB | -4.50 dB |
| -30.000 MHz | -20.000 MHz | 100 kHz | 5.379166666 GHz | -27.70 dBm | -31.99 dB | -2.99 dB |
| -20.000 MHz | -11.000 MHz | 100 kHz | 5.381410256 GHz | -24.29 dBm | -28.58 dB | -1.83 dB |
| -11.000 MHz | -9.000 MHz | 100 kHz | 5.389102564 GHz | -19.66 dBm | -23.94 dB | -4.97 dB |
| 9.000 MHz | 11.000 MHz | 100 kHz | 5.410897436 GHz | -20.82 dBm | -25.10 dB | -6.13 dB |
| 11.000 MHz | 20.000 MHz | 100 kHz | 5.418589744 GHz | -24.25 dBm | -28.53 dB | -1.78 dB |
| 20.000 MHz | 30.000 MHz | 100 kHz | 5.420833334 GHz | -27.92 dBm | -32.21 dB | -3.21 dB |
| 30.000 MHz | 50.000 MHz | 100 kHz | 5.431410256 GHz | -39.07 dBm | -43.36 dB | -3.36 dB |

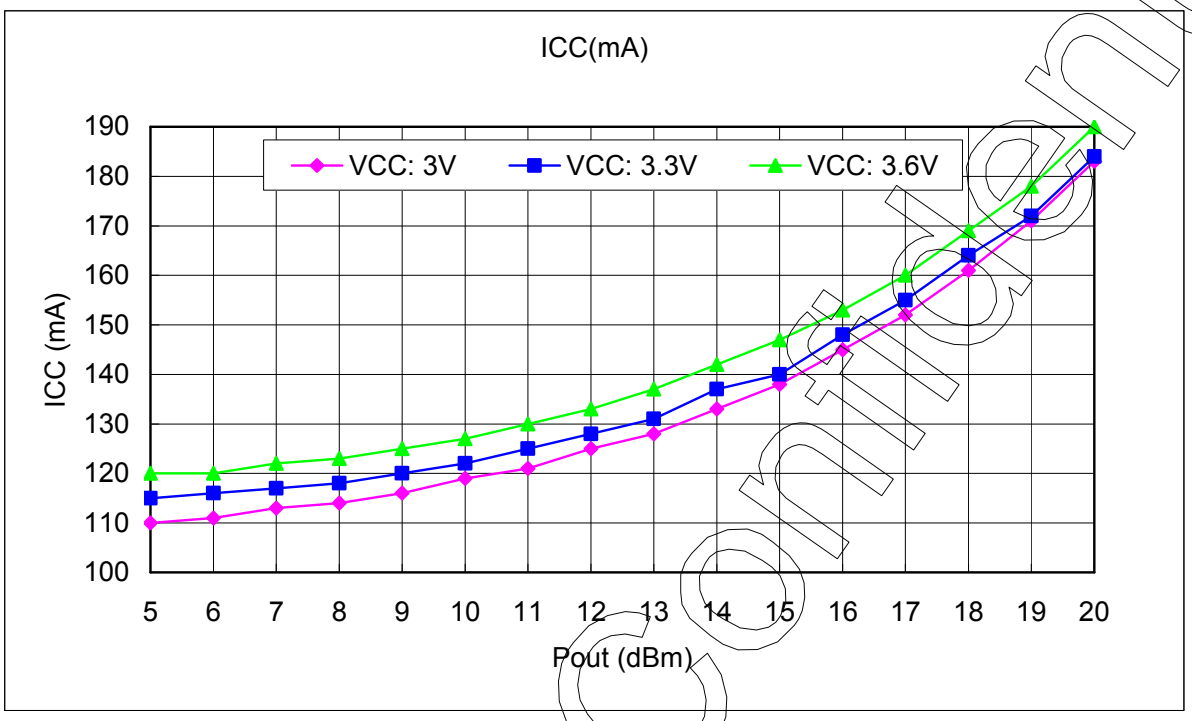


### *EVM and ICC vs. Pout(OFDM/54Mbps)*

T=25℃, Vcc=3.3V, Vref=2.9V

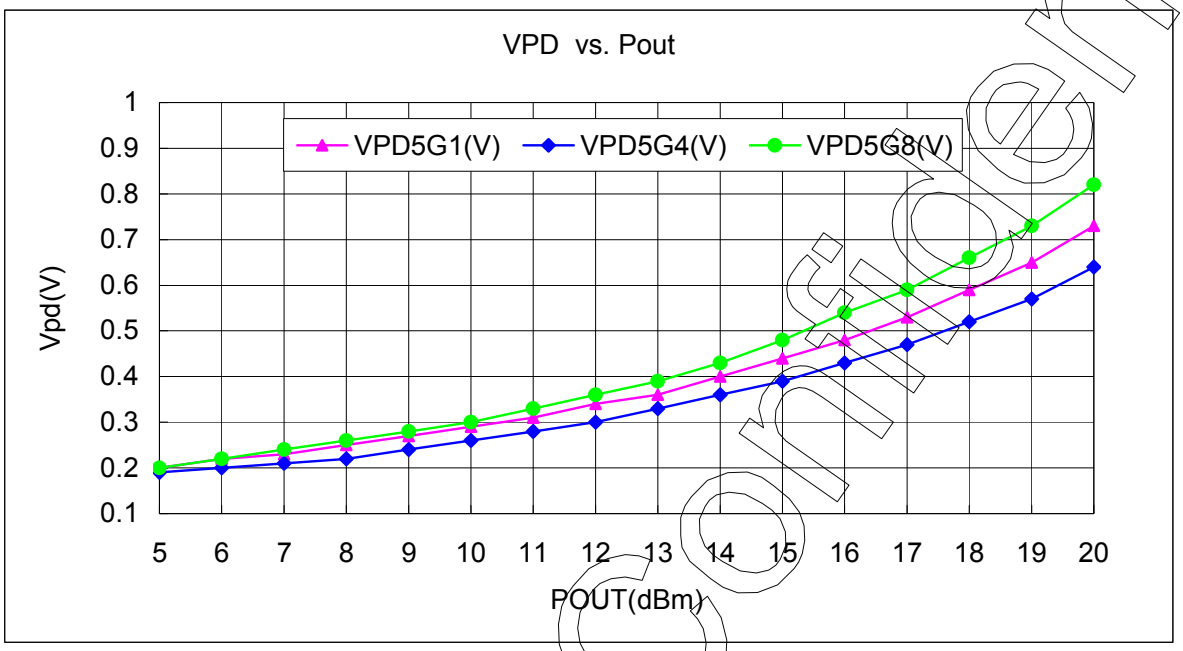


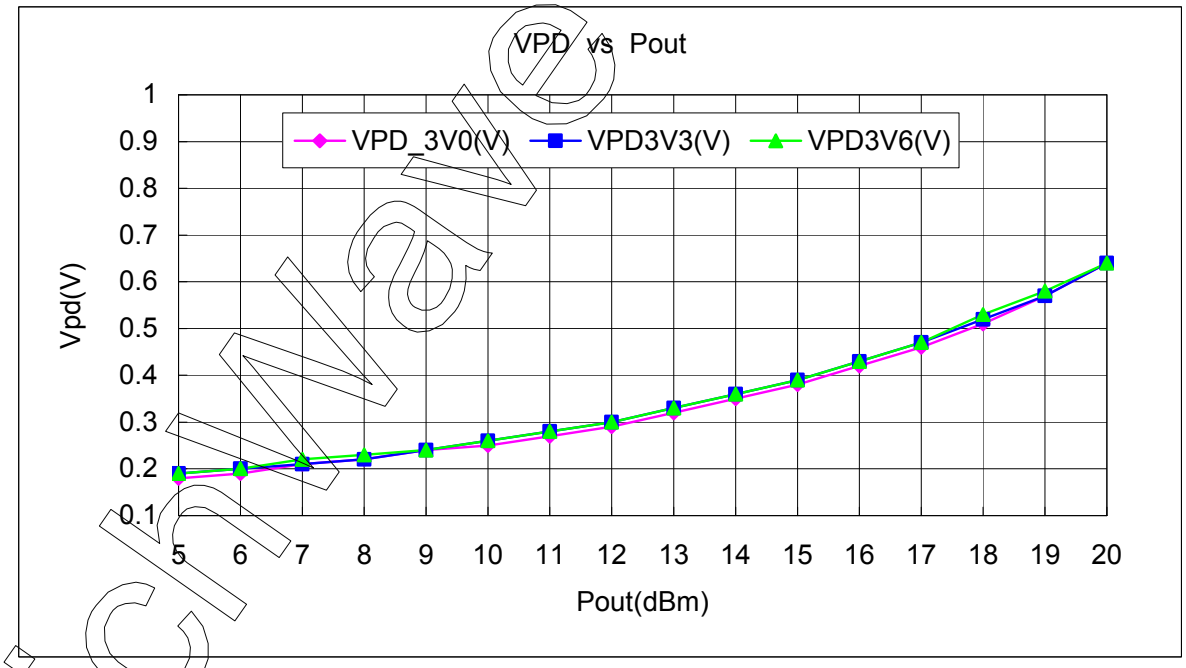


## POWER DETECTOR

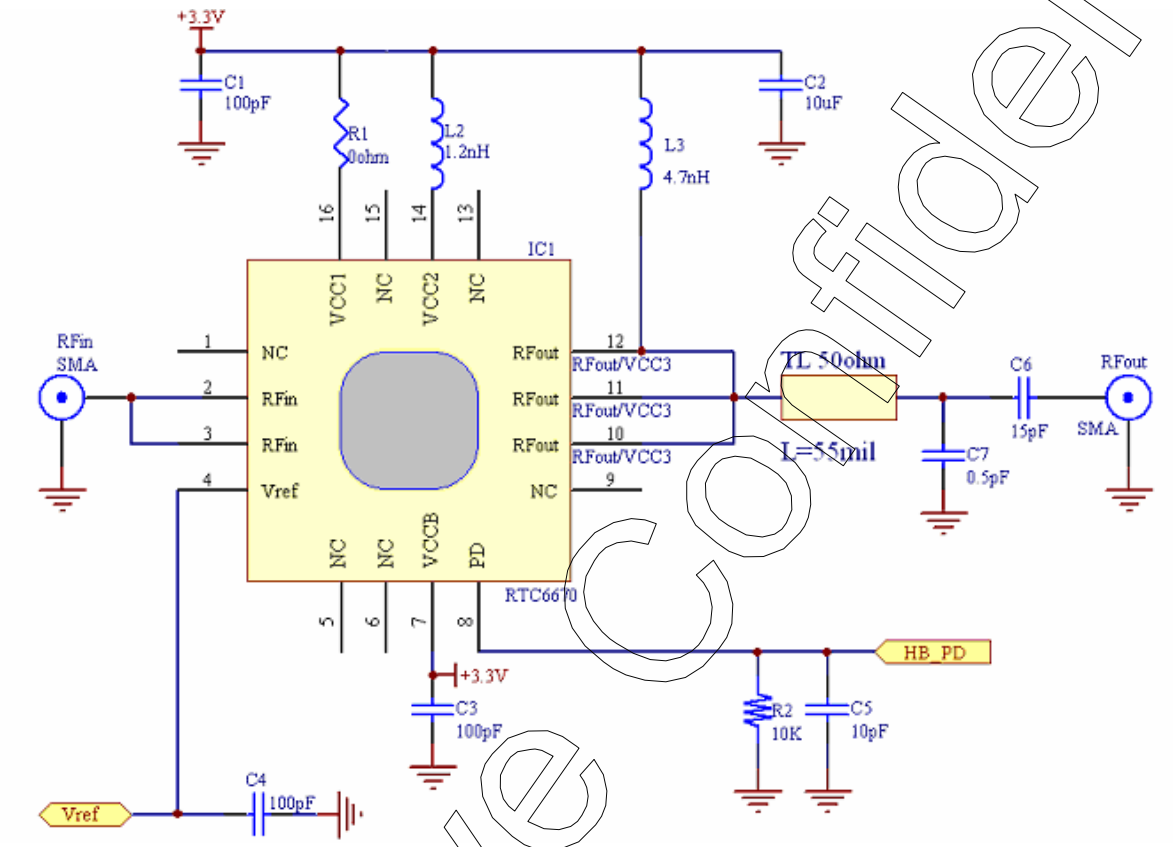
T=25℃, Vcc=3.3V, Vref=2.9V




T=25℃, Freq=5.4GHz, Vref=2.9V

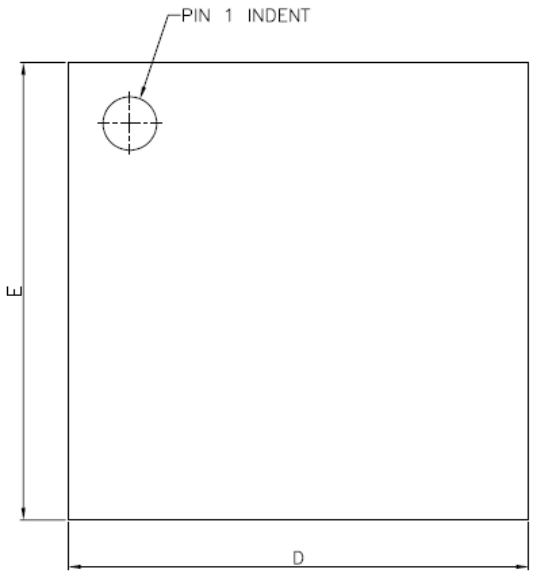


***APPLICATION CIRCUIT :***



## PACKAGE

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




| 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 |