

QPL9065 - 223MHz-235MHz Reference Design

Product Overview

The QPL9065 is a high-linearity, ultra-low noise 2-stage gain block amplifier module with a bypass mode functionality integrated to the second stage in the product. At 1.95GHz, the amplifier, under high gain mode, typically provides 37.5dB gain, +36dBm OIP3, and 0.55dB noise figure while drawing 160mA current from a +5V supply. The component also provides high performance in the low gain mode with 17.5dB gain, 0.55dB noise figure and +33dBm OIP3 while drawing 70mA current.

The QPL9065 uses a high-performance E-pHEMT process. This low noise amplifier contains an internal active bias to maintain high performance over temperature.

The QPL9065 covers the 0.45 – 3.8GHz frequency band and is targeted for wireless infrastructure. The QPL9065 is housed in a 3.5x3.5mm SMT package

Referenced Documents

The reference documents below take precedence over the contents of this application note, and should always be consulted for the latest information.

QPL9065 Data Sheet.

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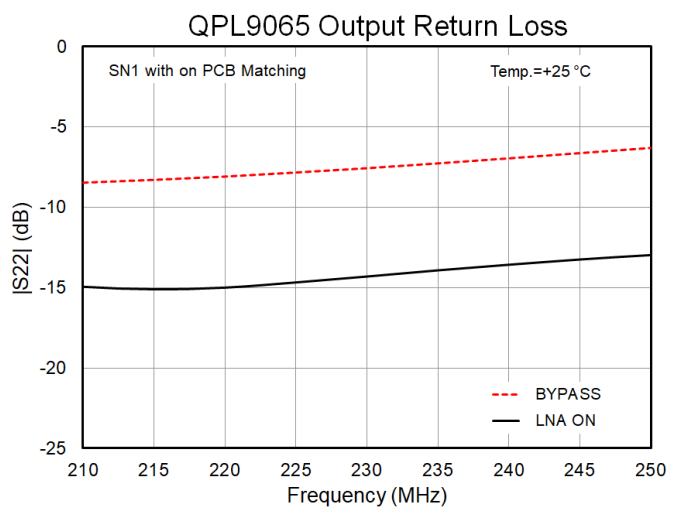
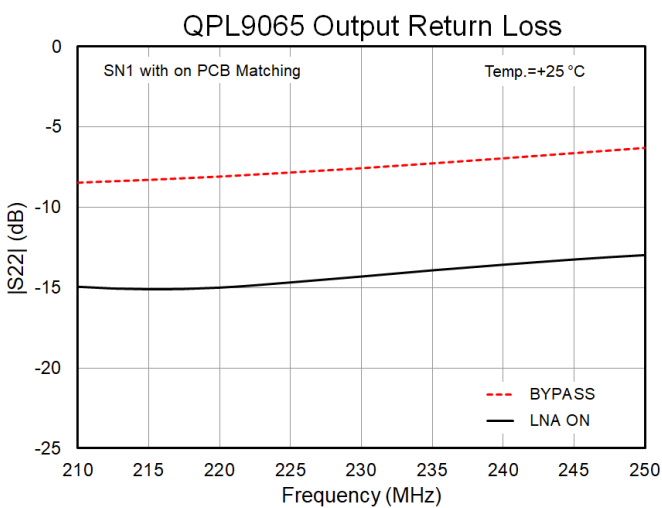
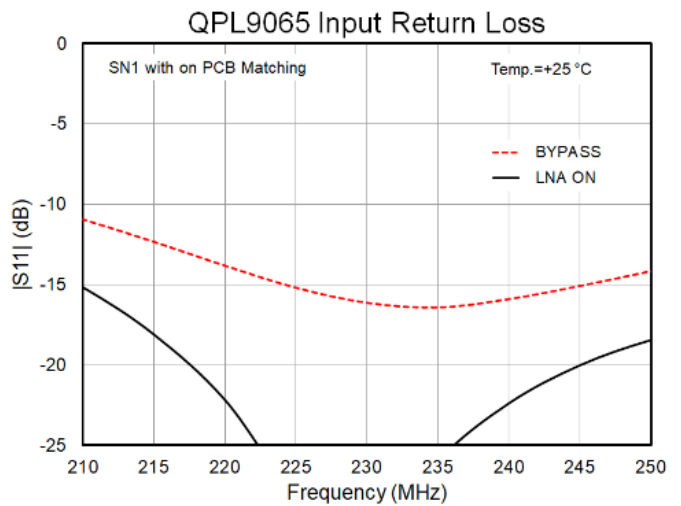
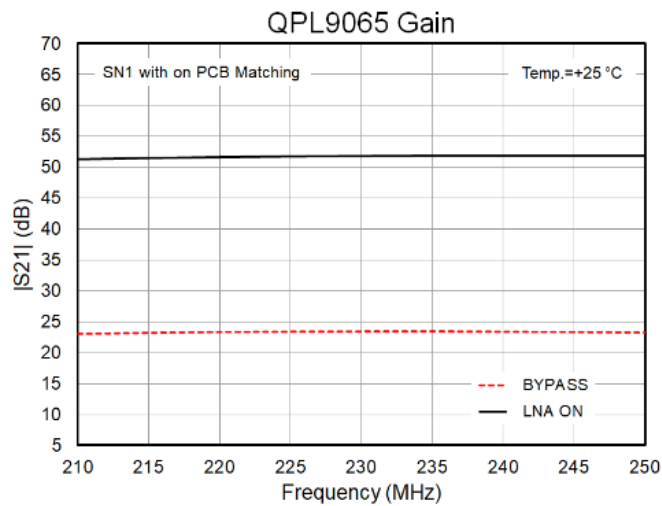
Application Electrical Performance

Qorvo Field and Factory Applications Engineers are available to provide technical assistance for determining appropriate matching networks for a particular application.

| Parameter | Conditions | Typical Value | | Units |
|--------------------|----------------|-----------------------------|------|-------|
| Frequency | | 233 | 235 | MHz |
| Gain | High Gain Mode | 51.7 | 51.8 | dB |
| Input Return Loss | | 25.2 | 25.9 | dB |
| Output Return Loss | | 14.8 | 13.9 | dB |
| Noise Figure | | 0.60 | 0.64 | dB |
| Output P1dB | | 18.3 | 17.9 | dBm |
| Output IP3 | | Pout= +3dBm/tone, Δf= 1 MHz | 33.3 | 33.5 |
| Gain | Low Gain Mode | 23.4 | 23.4 | dB |
| Input Return Loss | | 14.6 | 16.4 | dB |
| Output Return Loss | | 7.9 | 7.2 | dB |
| Noise Figure | | 0.60 | 0.63 | dB |
| Output P1dB | | - | - | dBm |
| Output IP3 | | Pout= +3dBm/tone, Δf= 1 MHz | 28.3 | 29.9 |

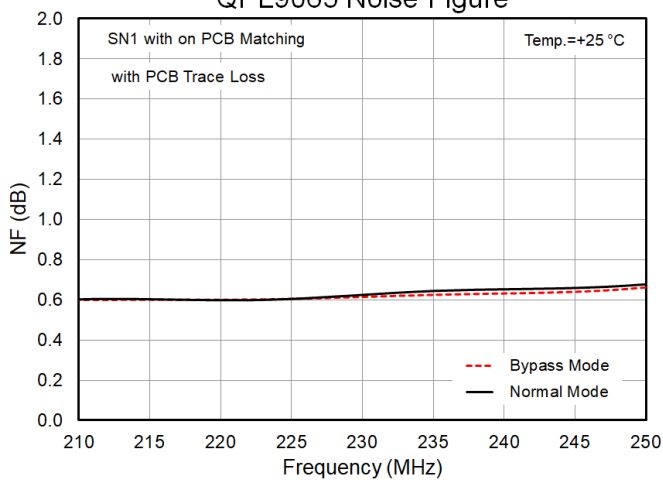
Test conditions unless otherwise noted: VDD = +5.0 V, Temp = +25 °C, 50 Ω system. Noise figure data with input trace and matching component losses.

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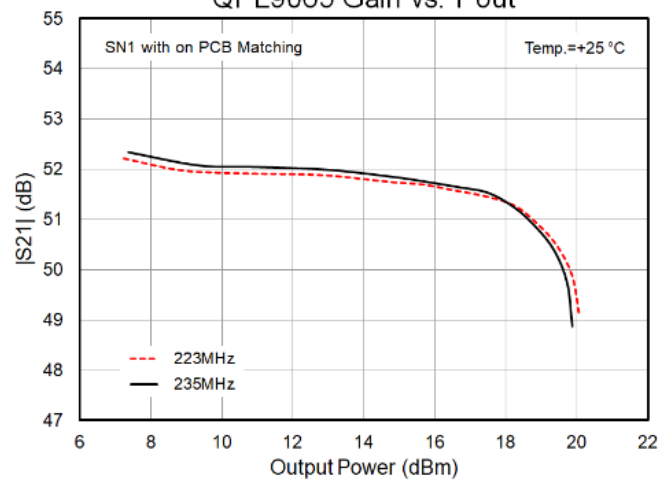


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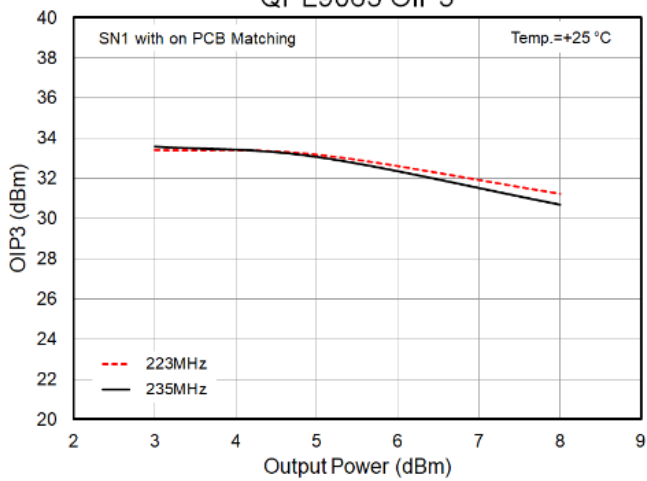
QPL9065 Noise Figure



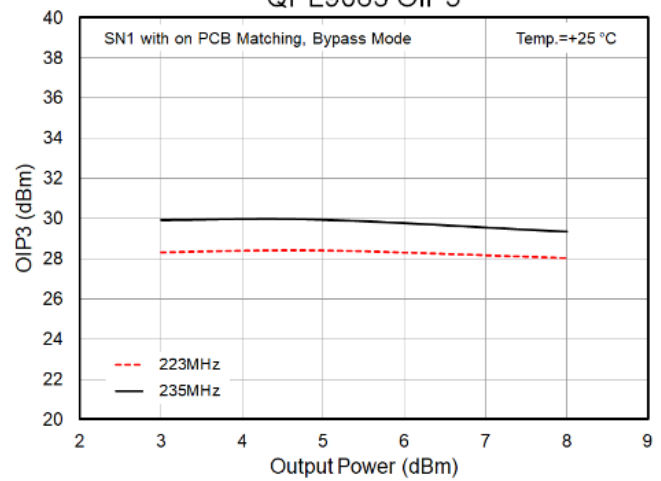
QPL9065 Gain vs. Pout



QPL9065 OIP3



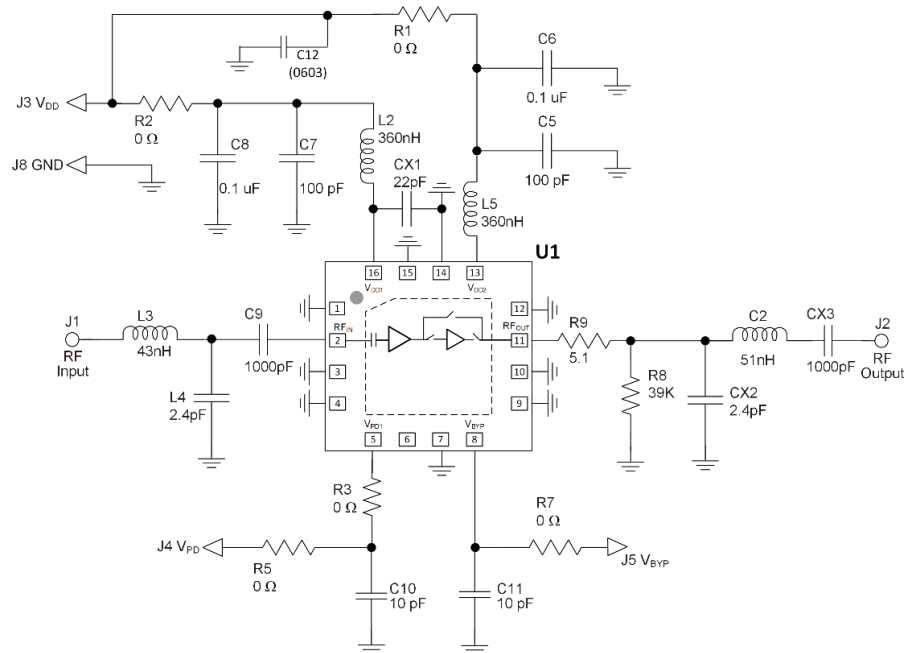
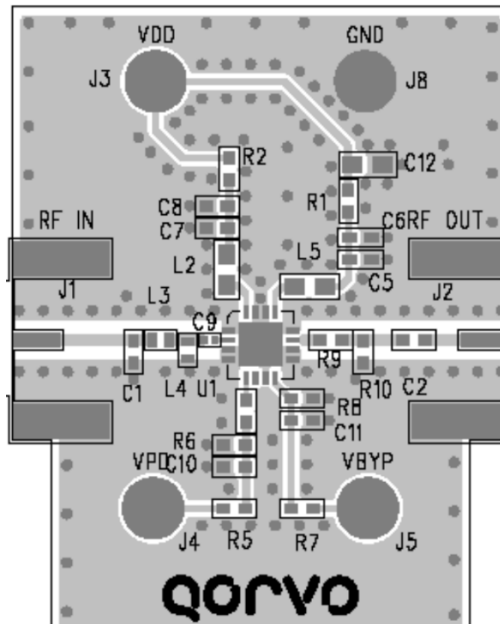
QPL9065 OIP3



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Evaluation Board Information

Evaluation Board and Schematic



Notes:

1. See Evaluation Board PCB Information section for PCB material and stack-up.

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Evaluation Board – Bill of Material

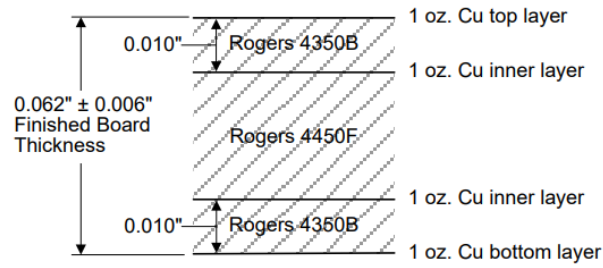
| Reference Des. | Value | Description | Manuf. | Part Number |
|----------------|--------|---------------------------------|-----------|-------------------|
| - | - | PCB | Qorvo | 1123139 |
| U1 | - | 2-Stage Bypass LNA | Qorvo | QPL9065 |
| C2 | 51nH | IND, 51nH, 2%, 0402 | Murata | LQW15AN51NG80 |
| C5, C7 | 100pF | CAP, 100pF, +/-5%, 50V, 0402 | Various | - |
| C6, C8 | 0.1μF | CAP, 0.1μF, 20%, 16V, Y5V, 0603 | Various | - |
| C9, CX3 | 1000pF | CAP, 1000pF, 5%, 50V, C0G, 0402 | Various | - |
| C10, C11 | 10pF | CAP, 10pF, 2%, 50V, 0402 | Murata | GRM0335C1H100GA01 |
| C12 | 4.7μF | CAP, 4.7μF, 20%, 10V, Y5V, 0603 | Various | - |
| CX1 | 22pF | CAP, 22pF, 2%, 50V, 0402 | Murata | GRM1555C1H220GA01 |
| CX2, L4 | 2.4pF | CAP, 2.4pF, 0.1%, 50V, 0402 | Murata | GRM1555C1H24BA01 |
| L2, L5 | 360nH | IND, 360nH, 5%, 0603 | Coilcraft | 0606HP-R36XJLU |
| L3 | 43nH | IND, 43nH, 2%, 0402 | Murata | LGW15AN43NG80 |
| R1, 2, 3, 5, 7 | 0Ω | RES, 0Ω, +/-5%, 1/16W, 0402 | Various | - |
| R9 | 5.1Ω | RES, 5.1Ω, +/-5%, 1/16W, 0402 | Various | - |
| R10 | 39K | RES, 39K, +/-5%, 1/16W, 0402 | Various | - |

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Evaluation Board PCB Board Layers

PC Board Layout

PCB 1123139 Material (stack up)



50-ohm line dimensions: width = 0.020", spacing = 0.032"

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Additional Information

For information on ESD, Soldering Profiles, Packaging Standards, Handling and Assembly, please contact Qorvo for general guidelines.

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

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