

Applications

- Repeaters
- Mobile Infrastructure
- LTE / WCDMA / CDMA / EDGE
- General Purpose Wireless

Product Features

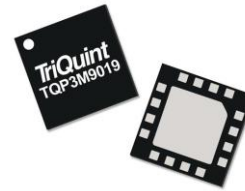
- 20 – 4000 MHz
- 22 dB Gain At 1900 MHz
- 1.3 dB Noise Figure At 1900 MHz
- +39.5 dBm Output IP3
- 50 Ohm Cascadable Gain Block
- Unconditionally Stable
- High Input Power Capability
- +5 V Single Supply, 125mA Current
- 3 x 3 mm QFN Package

General Description

The TQP3M9019 is a cascadable, high linearity gain block amplifier in a low-cost surface-mount package. At 1.9 GHz, the amplifier typically provides 22 dB gain, +39.5 dBm OIP3, and 1.3 dB Noise Figure while only drawing 125 mA current. The device is housed in a leadfree / green / RoHS-compliant industry-standard 16-pin 3 x 3 mm QFN package.

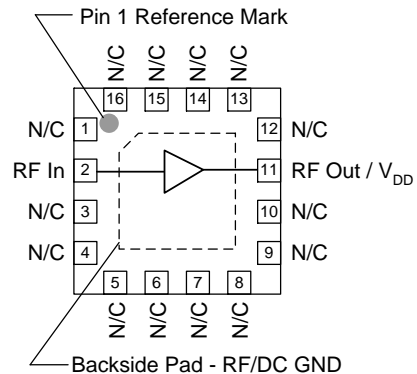
The TQP3M9019 has the benefit of having high gain across a broad range of frequencies while also providing very low noise. This allows the device to be used in both receiver and transmitter chains for high performance systems. The amplifier is internally matched using a high performance E-pHEMT process and only requires an external RF choke and blocking/bypass capacitors for operation from a single +5 V supply. The internal active bias circuit also enables stable operation over bias and temperature variations.

The TQP3M9019 covers the 0.02–4 GHz frequency band and is targeted for wireless infrastructure or other applications requiring high linearity and/or low noise figure.



16 Pin 3 x3 mm QFN Package

Functional Block Diagram



Pin Configuration

| Pin No. | Label |
|-----------------|--------------------------|
| 2 | RF In |
| 11 | RF Out / V _{DD} |
| All Other Pins | N/C |
| Backside Paddle | RF/DC GND |

Ordering Information

| Part No. | Description |
|------------------|-------------------------------|
| TQP3M9019 | High Linearity LNA Gain Block |
| TQP3M9019-PCB_IF | 50 – 500 MHz Evaluation Board |
| TQP3M9019-PCB_RF | 0.5 – 4 GHz Evaluation Board |

Standard T/R size = 2500 pieces on a 7" reel

Absolute Maximum Ratings

| Parameter | Rating |
|-----------------------------------|---------------|
| Storage Temperature | -65 to 150 °C |
| RF Input Power, CW, 50Ω, T=25 °C | +23 dBm |
| Supply Voltage (V _{DD}) | +7 V |
| Reverse Supply Voltage | -0.3 V |

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|---|-------|------|-------|-------|
| Supply Voltage (V _{DD}) | +4.75 | +5.0 | +5.25 | V |
| T _{CASE} | -40 | | +105 | °C |
| T _{ch} (for >10 ⁶ hours MTTF) | | | +190 | °C |

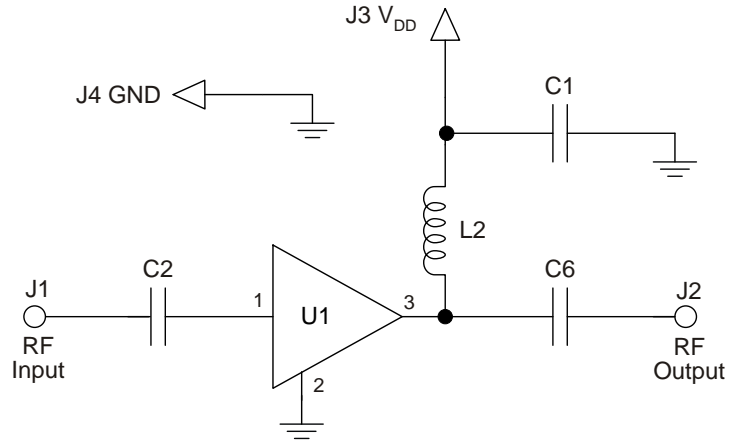
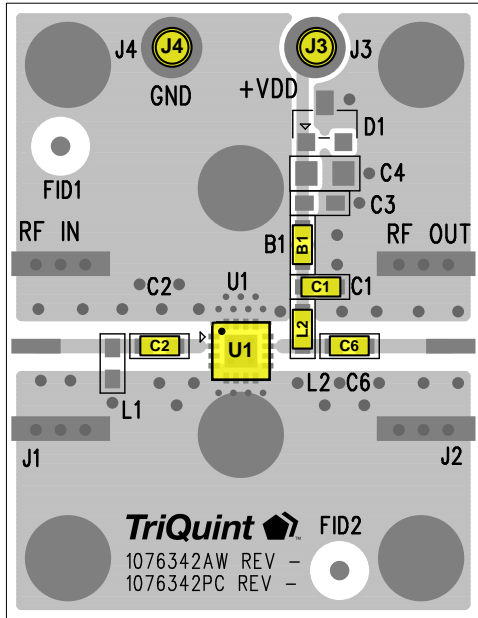
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

Test conditions unless otherwise noted: V_{DD}=+5 V, Temp.=+25 °C, 50 Ω system

| Parameter | Conditions | Min | Typ | Max | Units |
|-------------------------------------|---|-----|-------|------|-------|
| Operational Frequency Range | | 20 | | 4000 | MHz |
| Test Frequency | | | 1900 | | MHz |
| Gain | | 20 | 22 | 23 | dB |
| Input Return Loss | | | 10 | | dB |
| Output Return Loss | | | 13 | | dB |
| Output P1dB | | | +22 | | dBm |
| Output IP3 | P _{out} =+3 dBm/tone, Δf = 1 MHz | +36 | +39.5 | | dBm |
| Noise Figure | | | 1.3 | | dB |
| Current, I _{DD} | | | 125 | 150 | mA |
| Thermal Resistance, θ _{jc} | Module (junction to case) | | | 34 | °C/W |

TQP3M9019-PCB_IF / RF Evaluation Board



Notes:

1. See Evaluation Board PCB Information section for material and stack-up.
2. Components shown on the silkscreen but not on the schematic are not used.
3. B1 (0 Ω jumper) is not shown on the schematic and may be replaced with copper trace in the target application layout.
4. The recommended component values are dependent upon the frequency of operation.
5. All components are of 0603 size unless otherwise specified.

Bill of Material – TQP3M9019-PCB_IF / RF

| Reference Des. | TQP3M9019-PCB_RF 500 MHz – 4000 MHz | TQP3M9019-PCB_IF 50 MHz – 500 MHz |
|----------------|--|--------------------------------------|
| U1 | TQP3M9019 | TQP3M9019 |
| C2, C6 | 100 pF | 1000 pF |
| C1 | 0.01 uF | 0.01 uF |
| L2 | 68 nH | 330 nH |
| B1 | Do Not Place | Do Not Place |
| L1, D1, C3, C4 | 0 Ω | 0 Ω |

Note: Performances can be optimized at frequency of interest by using recommended component values shown in the table below. Inductors are wirewound Coilcraft.

| Reference Designation | Frequency (MHz) | | | | | |
|-----------------------|-----------------|---------|--------|-------|-------|-------|
| | 50 | 200 | 500 | 2000 | 2500 | 3500 |
| C2, C6 | 0.01 uF | 1000 pF | 100 pF | 22 pF | 22 pF | 22 pF |
| L2 | 470 nH | 220 nH | 82 nH | 22 nH | 18 nH | 15 nH |

Typical Performance – TQP3M9019-PCB_RF

Test conditions unless otherwise noted: $V_{DD}=+5\text{ V}$, $I_{DD}=125\text{ mA}$, Temp.= $+25\text{ }^{\circ}\text{C}$, $50\ \Omega$ system

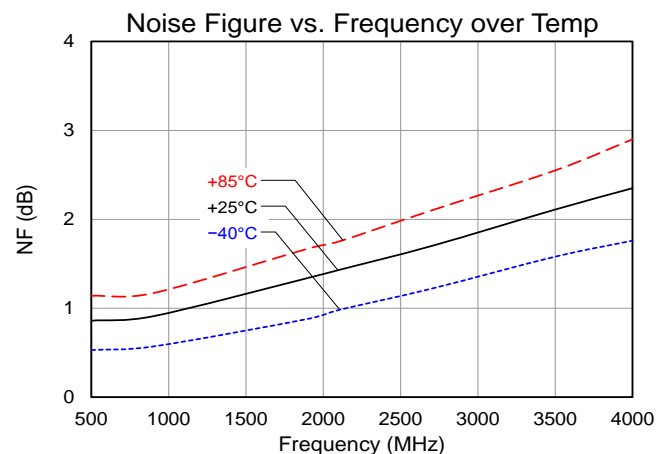
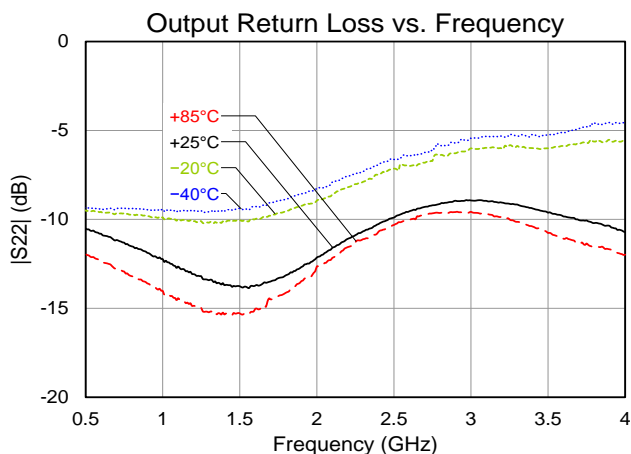
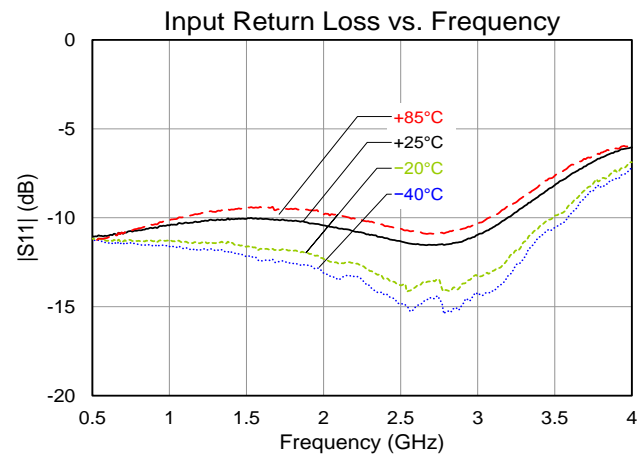
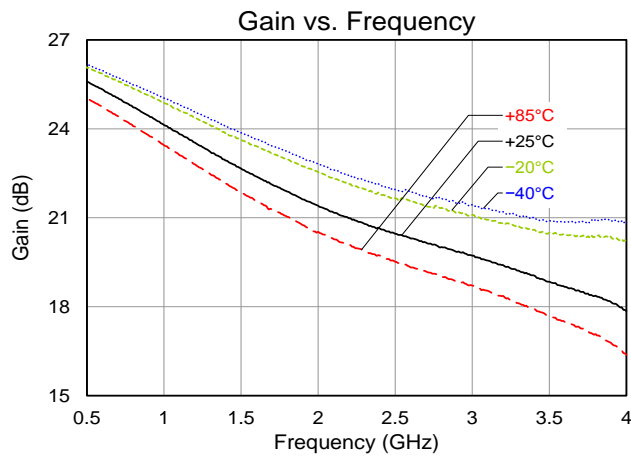
| Parameter | Typical Value | | | | | | Units |
|-----------------------------|---------------|-------|-------|-------|-------|-------|-------|
| Frequency | 500 | 900 | 1900 | 2700 | 3500 | 4000 | MHz |
| Gain | 25.6 | 24.6 | 22 | 20.5 | 19 | 18.3 | dB |
| Input Return Loss | 11 | 10.5 | 10 | 11.5 | 8 | 6 | dB |
| Output Return Loss | 10.5 | 12 | 13 | 9 | 10 | 11 | dB |
| Output P1dB | +22.4 | +22.3 | +22 | +21.7 | +21.4 | +20.8 | dBm |
| OIP3 ⁽¹⁾ | +41.8 | +40.6 | +40.6 | +38.5 | +38.8 | +37.9 | dBm |
| Noise figure ⁽²⁾ | 0.9 | 0.9 | 1.3 | 1.7 | 2.1 | 2.4 | dB |

Notes:

- OIP3 measured with two tones at an output power of +4 dBm / tone separated by 1 MHz.
- Noise figure data listed in the table above includes PCB losses. ~0.1dB at 2 GHz.

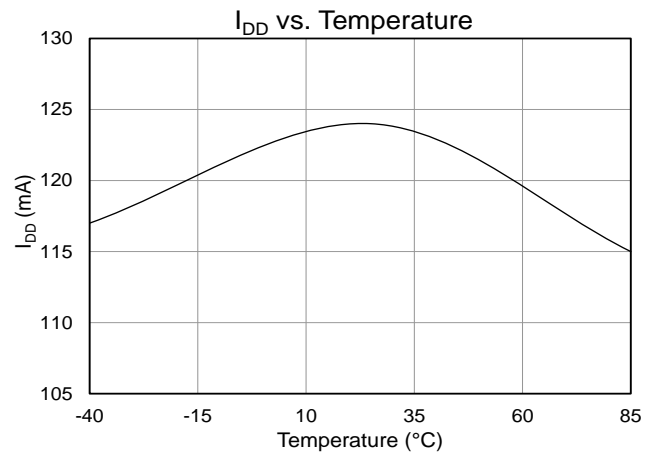
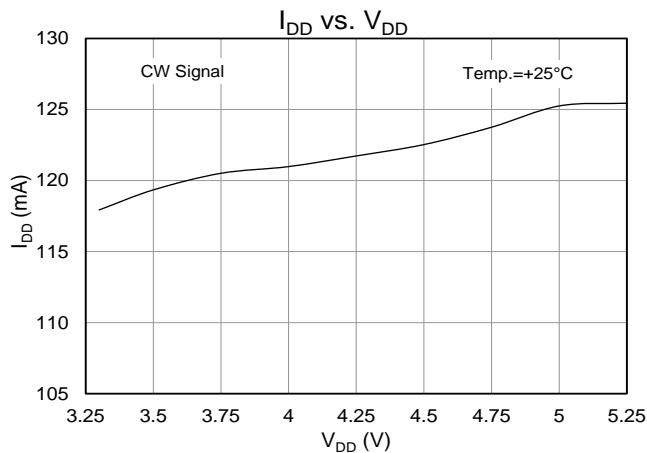
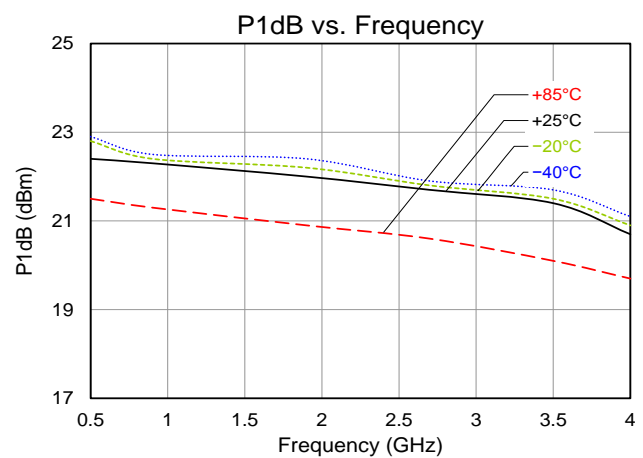
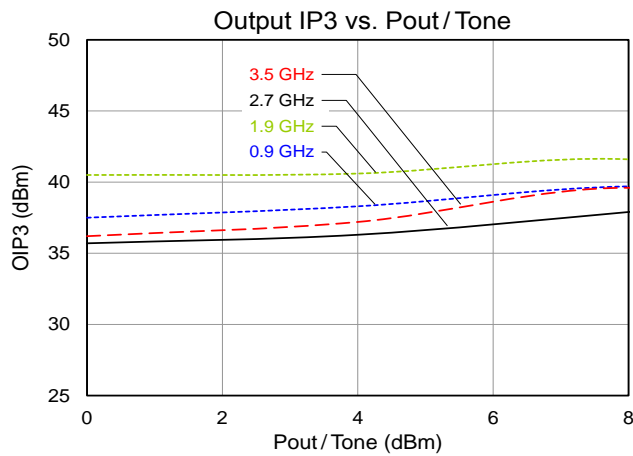
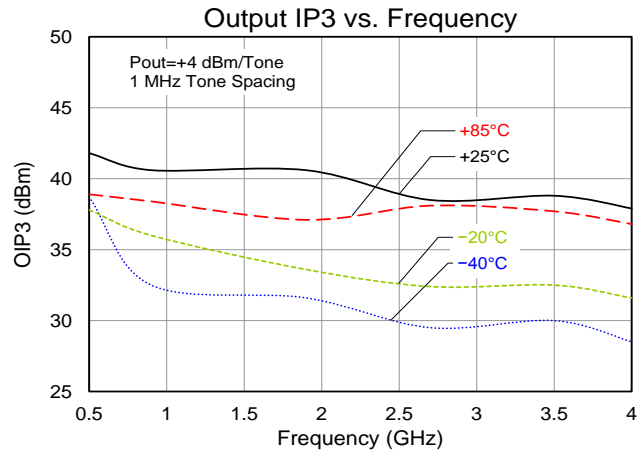
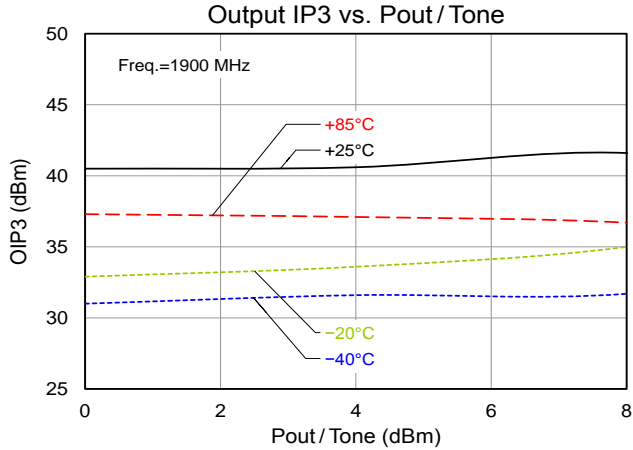
Performance Plots – TQP3M9019-PCB_RF

Test conditions unless otherwise noted: $V_{DD}=+5\text{ V}$, $I_{DD}=125\text{ mA}$, Temp.= $+25\text{ }^{\circ}\text{C}$, $50\ \Omega$ system



Performance Plots – TQP3M9019-PCB_RF

Test conditions unless otherwise noted: $V_{DD}=+5\text{ V}$, $I_{DD}=125\text{ mA}$, Temp.=+25 °C, 50 Ω system



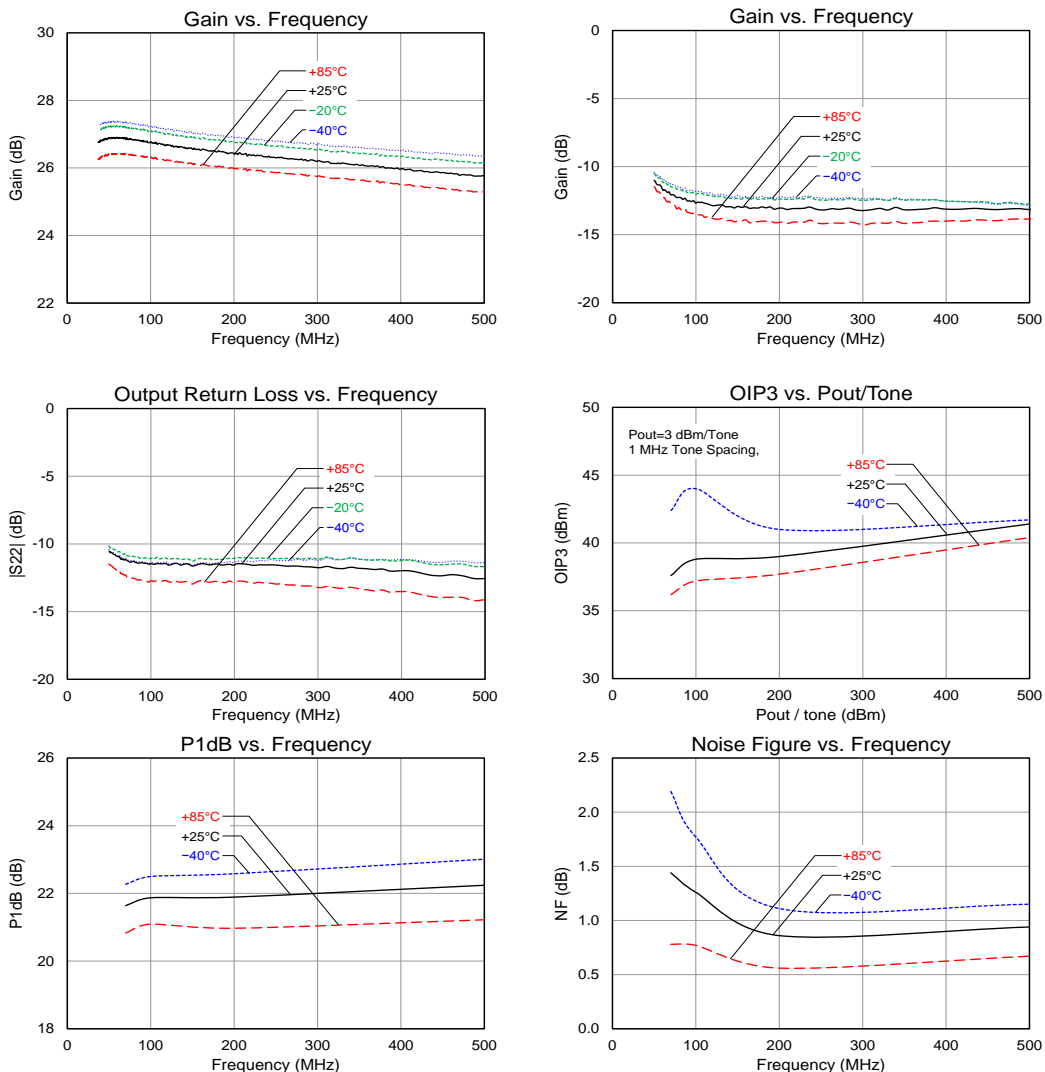
Typical Performance – TQP3M9019-PCB_IF

Test conditions unless otherwise noted: $V_{DD}=+5V$, $I_{DD}=125\text{ mA typ.}$, Temp= $+25^{\circ}\text{C}$

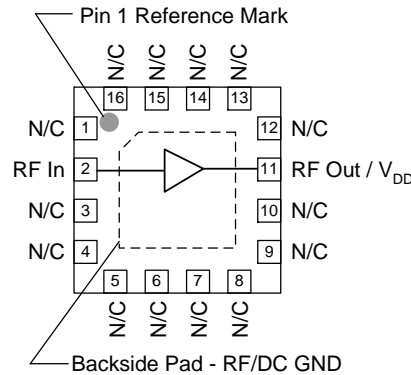
| Parameter | Conditions | Typical Values | | | | Units |
|--------------------|--|----------------|-------|-------|-------|-------|
| Frequency | | 70 | 100 | 200 | 500 | MHz |
| Gain | | 27 | 26.8 | 26.4 | 25.8 | dB |
| Input Return Loss | | 12 | 13 | 13 | 13 | dB |
| Output Return Loss | | 11 | 11 | 12 | 13 | dB |
| Output P1dB | | +21.6 | +21.9 | +21.9 | +22.2 | dBm |
| OIP3 | $P_{out} = +3\text{ dBm/tone}$, $\Delta f=1\text{ MHz}$ | +37.6 | +38.8 | +39 | +41.4 | dBm |
| Noise figure | | 1.4 | 1.3 | 0.9 | 0.9 | dB |

Performance Plots – TQP3M9019-PCB_IF

Test conditions unless otherwise noted: $V_{DD}=+5V$, Temp.= $+25^{\circ}\text{C}$



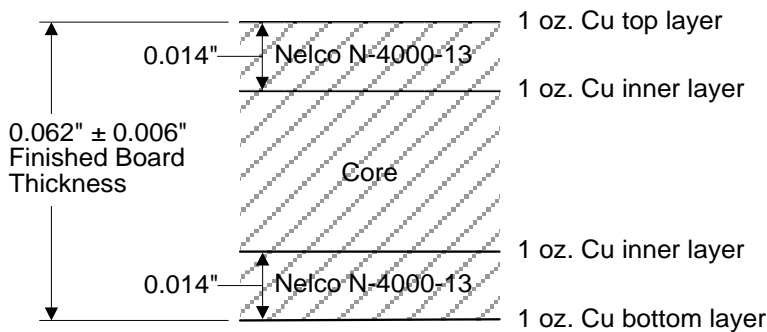
Pin Configuration and Description



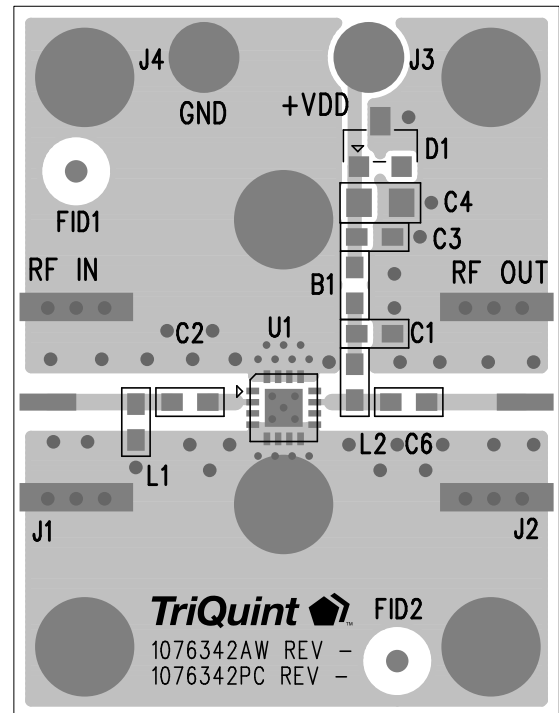
| Pin No. | Label | Description |
|----------------|--------------------------|--|
| 2 | RF In | RF input matched to 50 ohms. External DC Block is required. |
| 11 | RF Out / V _{DD} | RF output matched to 50 ohms. Bias voltage and external DC Block required. |
| All other pins | N/C | No internal connection. Provide grounded PCB land pads for optimal isolation and mounting integrity. |
| Backside Pad | RF/DC GND | RF/DC ground. Use recommended via pattern to minimize inductance and thermal resistance. See PCB Mounting Pattern. |

Evaluation Board PCB Information

TriQuint PCB 1076342 Material and Stack-up

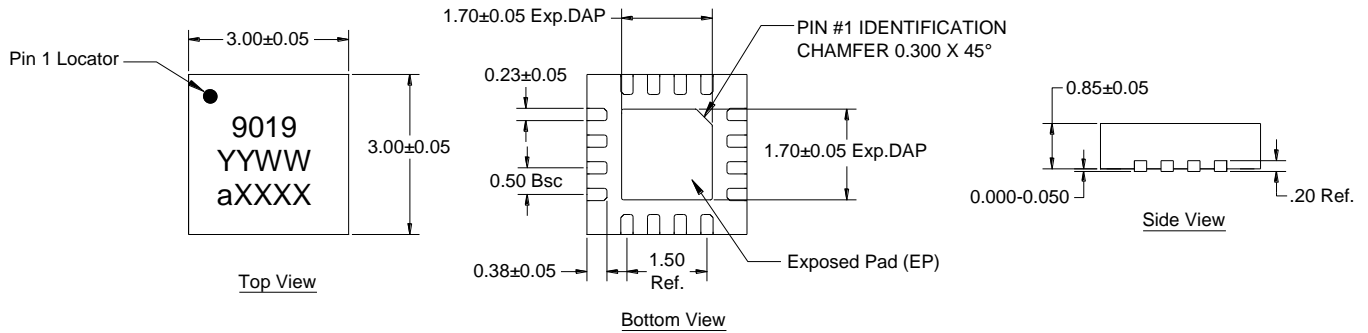


50 ohm line dimensions: width = 0.029", spacing = 0.035"



Package Marking and Dimensions

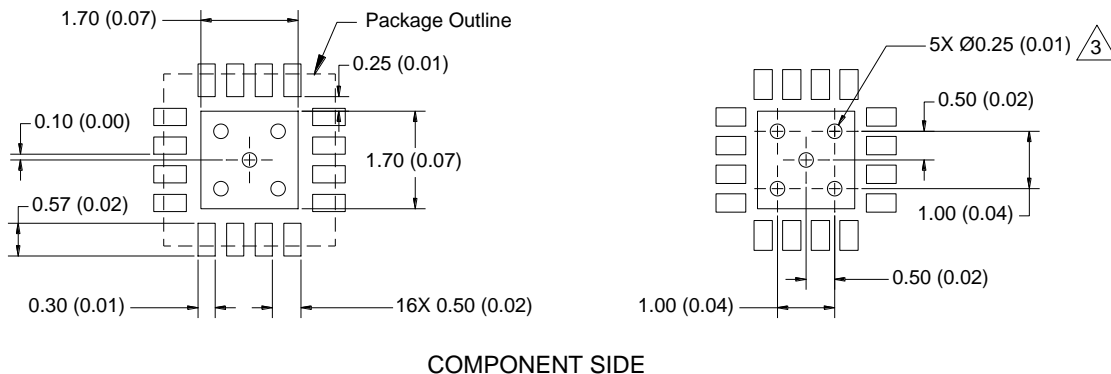
Package Marking: Part number – 9019
Year/week/country code – YYWW
Lot code – aXXXX



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

PCB Mounting Pattern



Notes:

1. All dimensions are in millimeters (inches). Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Ground/thermal vias are required for the proper operation of this device. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25mm (0.10").
4. Ensure good package backside exposed pad (EP) solder attach for best electrical and thermal performance.

Product Compliance Information

ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: Class 1A
Value: ≥ 250 V to < 500 V
Test: Human Body Model (HBM)
Standard: ESDA / JEDEC Standard JS-001-2012

ESD Rating: Class C3
Value: ≥ 1000 V
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101F

MSL Rating

MSL Rating: Level 1
Test: 260 °C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

Compatible with both lead-free (260 °C max. reflow temperature) and tin/lead (245 °C max. reflow temperature) soldering processes.

Contact plating: Annealed Matte Tin

RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.triquint.com Tel: 877-800-8584
Email: customer.support@qorvo.com

For information about the merger of RFMD and TriQuint as Qorvo:

Web: www.qorvo.com

For technical questions and application information:

Email: sjcappliations.engineering@qorvo.com

Important Notice

The information contained herein is believed to be reliable. TriQuint makes no warranties regarding the information contained herein. TriQuint assumes no responsibility or liability whatsoever for any of the information contained herein. TriQuint assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for TriQuint products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

TriQuint products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.