QPA9862

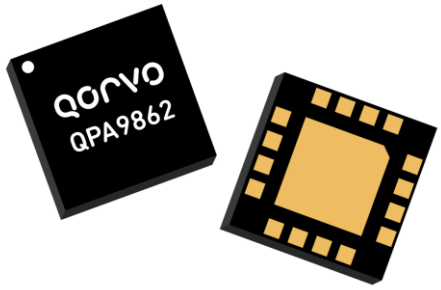
3.3 – 4.2 GHz 0.8 W High-Linearity Pre-Driver

Product Overview

The QPA9862 is an efficient wideband, high linearity driver amplifier. It provides 36.5dB gain at 3.6GHz and achieves a P3dB of 29.5dBm. The amplifier is designed to handle wideband 5G NR instantaneous signal bandwidths of up to 600MHz, making it perfectly suited for 5G m-MIMO applications.

The QPA9862 is internally match to 50Ω over the entire operating frequency band of 3.3 – 4.2 GHz and incorporates a fast enable/disable function through the V_{EN} pin.

The QPA9862 is housed in a 16-pin 3X3mm SMT package and is footprint and pin-compatible to QPA9120, QPA9121 and QPA9122M.

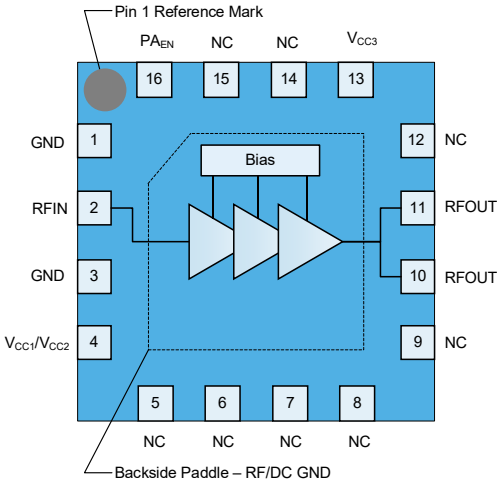


16 Pad 3 x 3 mm Laminate Package

Key Features

- 3.3 – 4.2 GHz Operational Frequency
- 50Ω Matched RF Input and Output
- +29.9 dBm P3dB
- 36.5 dB Gain at 3.6 GHz
- ≥400MHz IBW capability
- -48dBc ACPR @ Pout=16dBm
- +5 V Single Supply with I_{CQ} = 110mA
- Fast Enable/Disable for TDD Operation

Functional Block Diagram



Top View

Applications

- 5G m-MIMO
- Mobile Infrastructure
- General Purpose Wireless
- TDD System

Ordering Information

Part No.	Description
QPA9862SB	5pcs Sample Bag
QPA9862EVB01	Evaluation Board

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-65 to +150°C
RF Input Power, ON/OFF state, CW, over Temperature, 3:1 VSWR, In-band	+6 dBm
RF Input Power, ON/OFF state, 1C 20MHz LTE, 9.5dB PAR, over Temperature, 3:1 VSWR, In-band	+6 dBm
Device Voltage (V_{CC1}/V_{CC2}, V_{CC3})	+5.5 V

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Supply Voltage (V_{CC})	+4.75	+5	+5.25	V
T_{CASE}	-40		+115	°C
Tj for 10^6 hours MTTF			TBD	°C

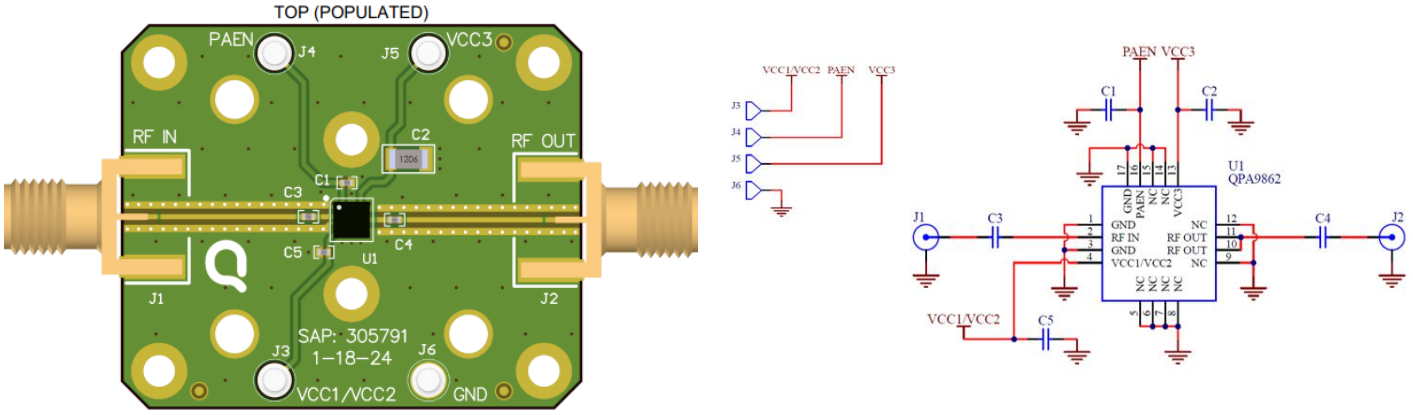
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions. Operating the part above the maximum recommended Tcase may degrade performance.

Electrical Specifications

Parameter	Conditions (1)(2)	Min	Typ	Max	Units
Operational Frequency Range		3300		4200	MHz
Gain	At 3.6 GHz		36.5		dB
Gain Flatness	Any 600 MHz BW within operating band		±0.6		dB
Input Return Loss			11.0		dB
Output Return Loss			8.5		dB
Reverse Isolation	ON state		49.0		dB
Forward Isolation	OFF state		48.0		dB
Output P1dB	At 3.6 GHz		28.8		dBm
Output P3dB	At 3.6 GHz		29.9		dBm
ACPR	At 3.6 GHz, Pout=+16 dBm, NR 1C100MHz, 8.5dB PAR		-48.0		dBc
Noise Figure	At 3.6 GHz, Trace Loss Deducted		3.7		dB
Device Current, ON	Quiescent Current		110		mA
Device Current, OFF	V_{EN} = 0 V		3		µA
V_{EN}, Logic Low		-0.13		0.63	V
V_{EN}, Logic High		1.17		V_{CC}	V
Device ON or OFF Timing	50% Ctrl to 10/90% RF			500	ns
Thermal Resistance, θ_{jc}	Junction to case		31		°C/W

Notes:
1. Test conditions unless otherwise noted: V_{CC1}/V_{CC2} = V_{CC3} = +5.0 V, V_{EN} = +1.8 V, I_{CQ}=110mA, Temp = +25 °C, 50 Ω system.
2. Reference plane is at the EVB connectors.

Evaluation Board



Notes:
1. Components shown on PCB layout but not on the schematic are not used.

Bill of Materials

Reference Des.	Value	Description	Manuf.	Part Number
n/a		Printed Circuit Board	Qorvo	
U1		High Gain Driver Amplifier	Qorvo	QPA9862
C1	DNP			
C2	10uF	CAP, 10%, 25V, X7R, 1206	Various	
C3	3pF	CAP, ±0.1pF, 100V, HI-Q, 0402	Various	
C4	18pF	CAP, 5%, 50V, HI-Q, 0402	Various	
C5	1uF	CAP, 10%, 10V, X7S, 0402	Various	
J1, J2		Conn, SMA F STRT .062”		

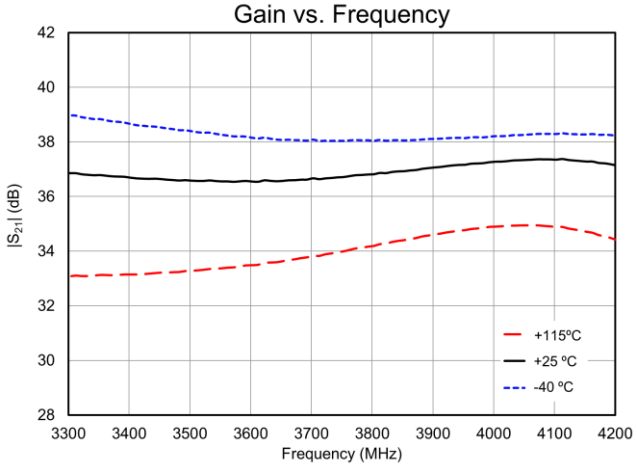
Logic Table

Parameter, V_{EN}	High	Low
Device State	ON	OFF
Voltage	>1.17V	<0.63V

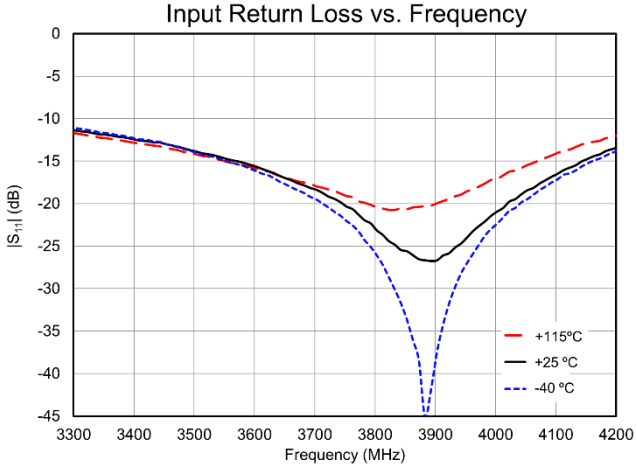
Performance Plots

Test conditions unless otherwise noted: V_{CC1} /V_{CC2} = V_{CC3} = +5.0 V, V_{EN} = +1.8 V, I_{CQ}=110mA, Temp = +25 °C, on EVB.

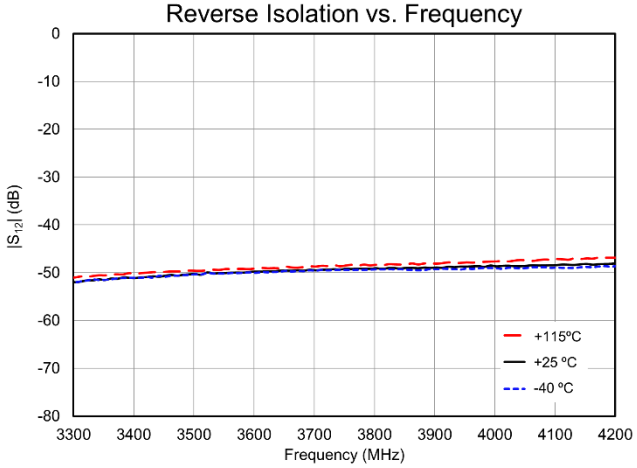
Gain vs. Frequency



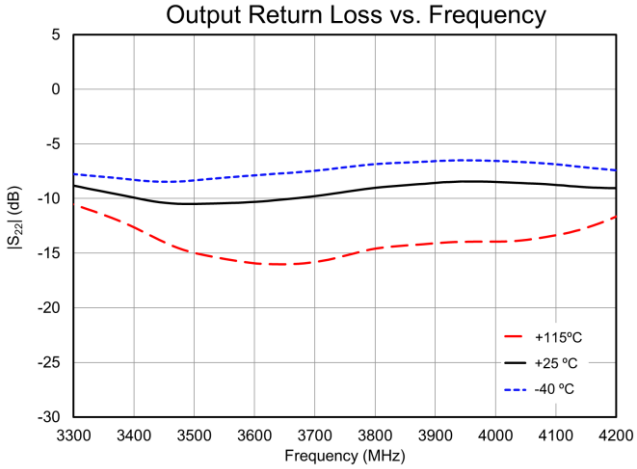
Input Return Loss vs. Frequency



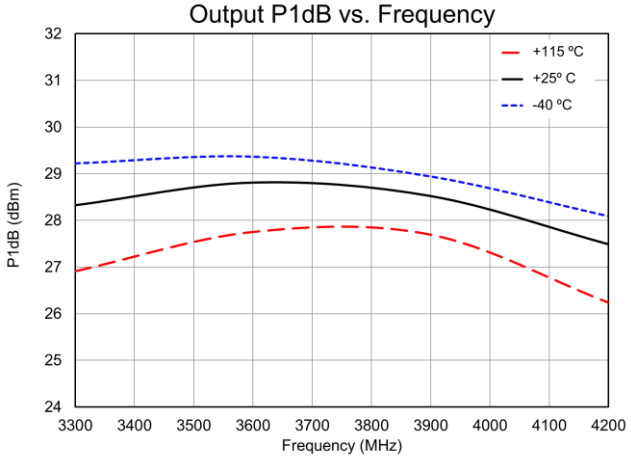
Reverse Isolation vs. Frequency



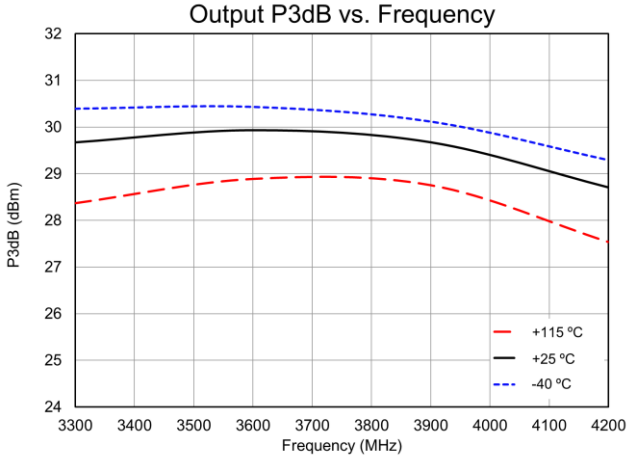
Output Return Loss vs. Frequency



Output P1dB vs. Frequency

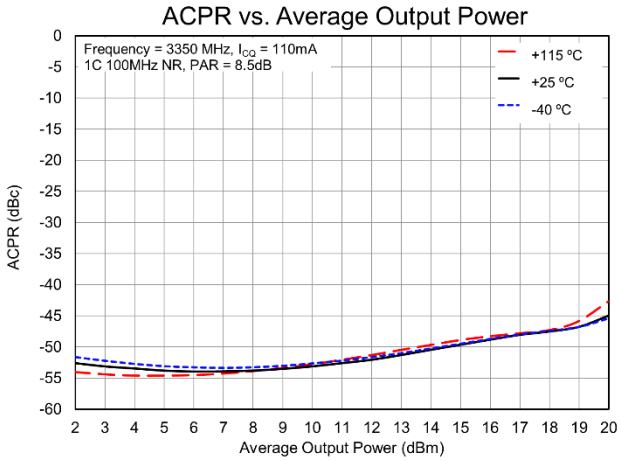


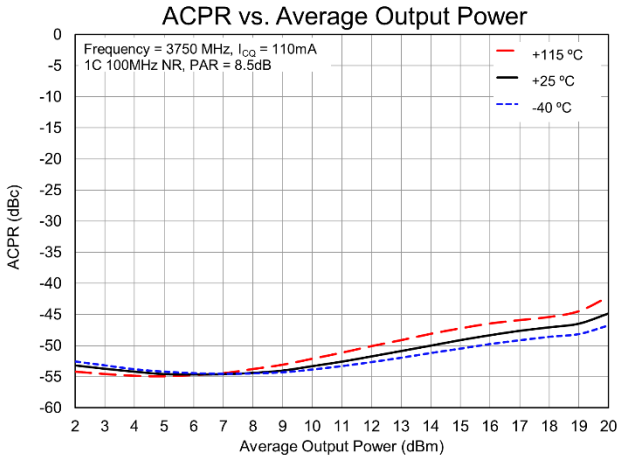
Output P3dB vs. Frequency

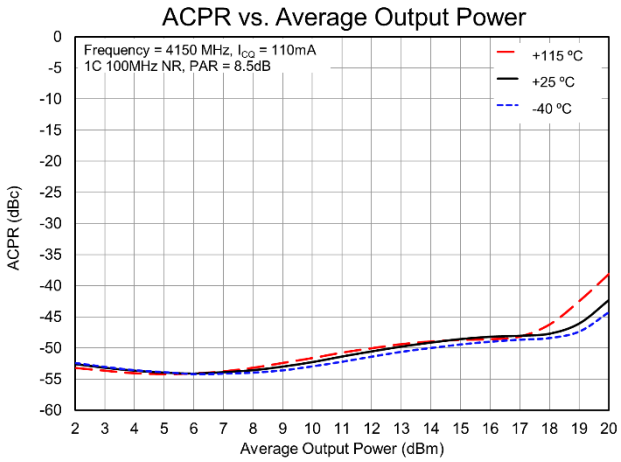


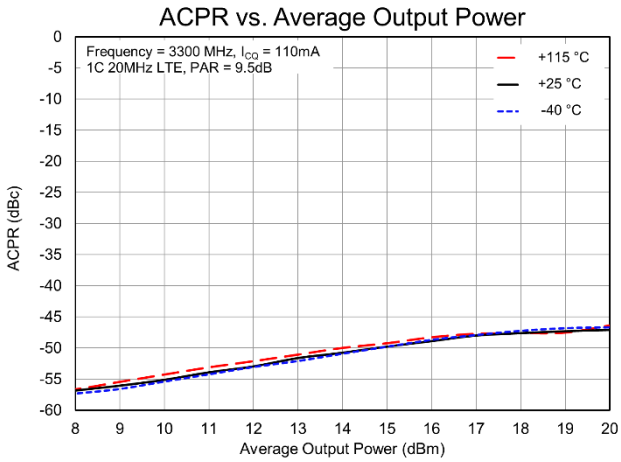
Performance Plots

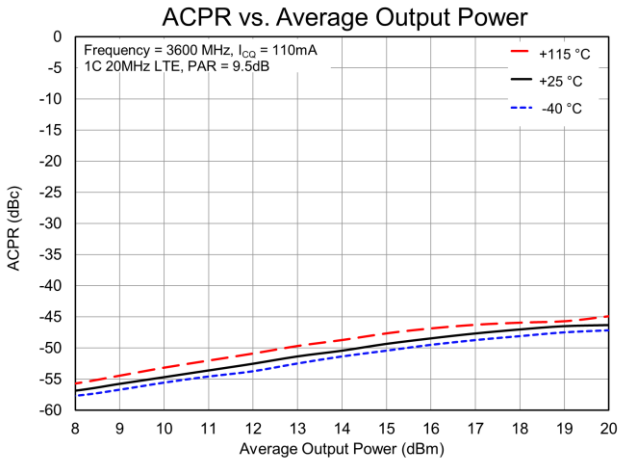
Test conditions unless otherwise noted: V_{CC1} /V_{CC2} = V_{CC3} = +5.0 V, V_{EN} = +1.8 V, I_{CQ}=110mA, Temp = +25 °C, on EVB.

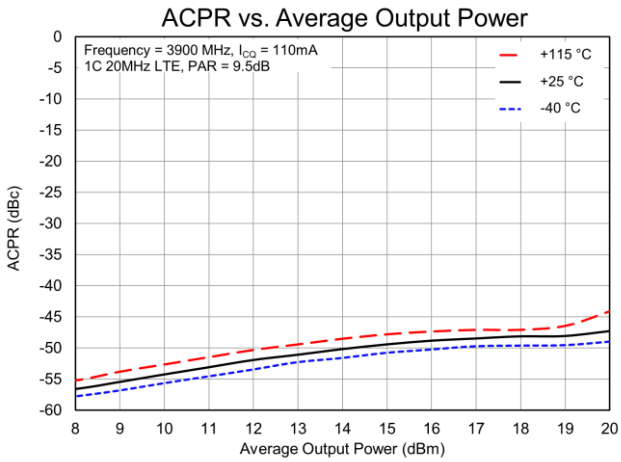


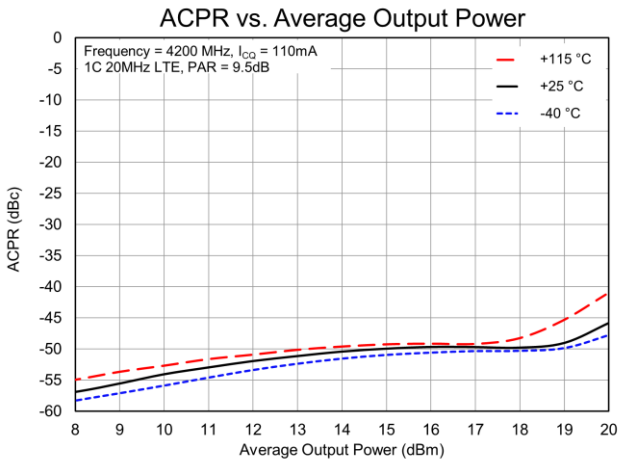


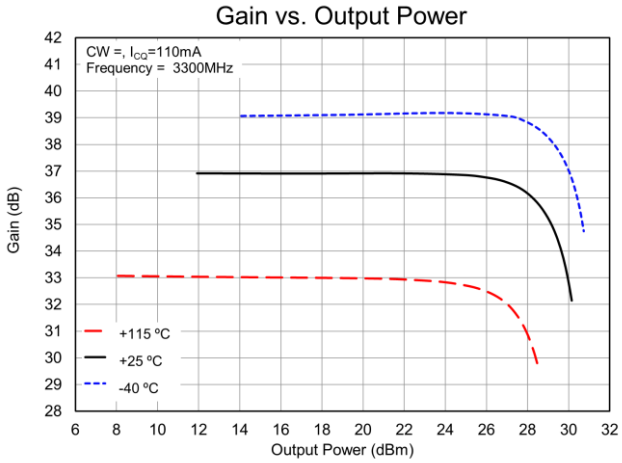


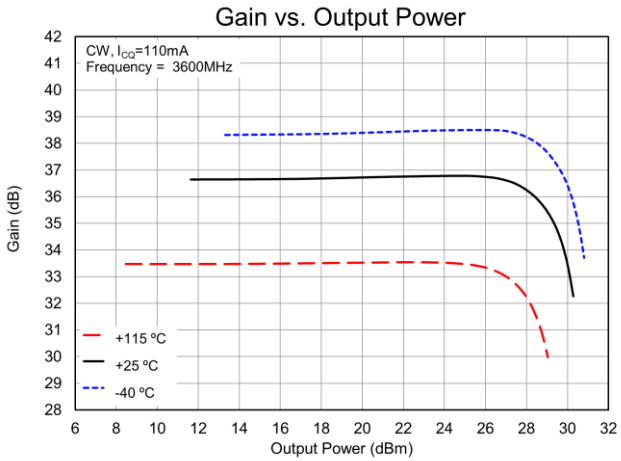


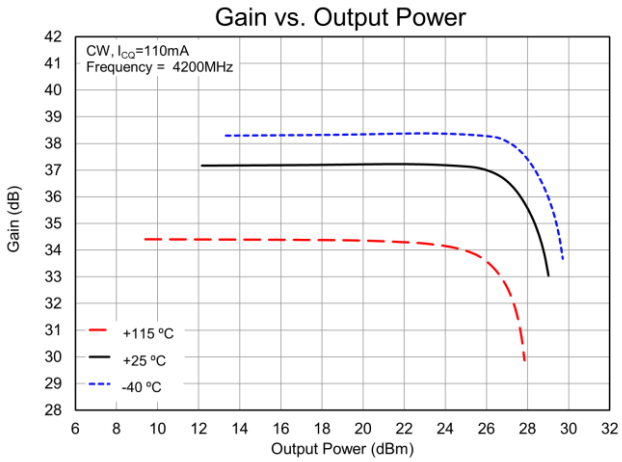


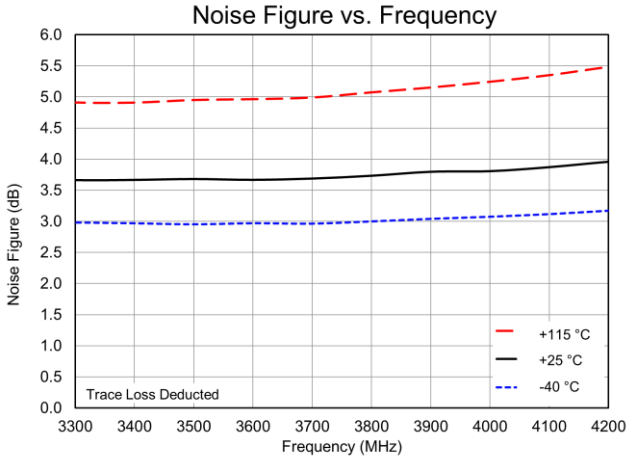


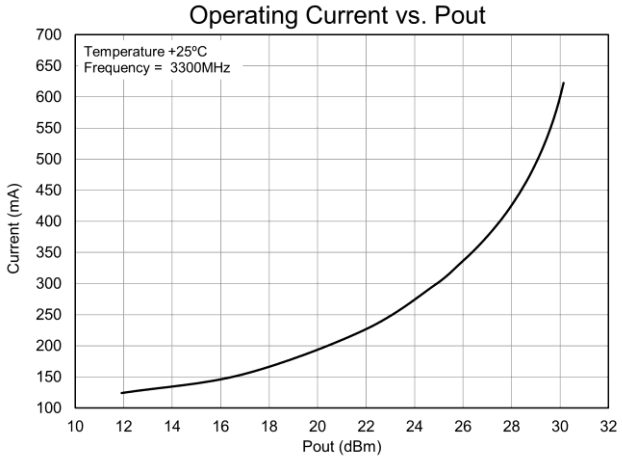




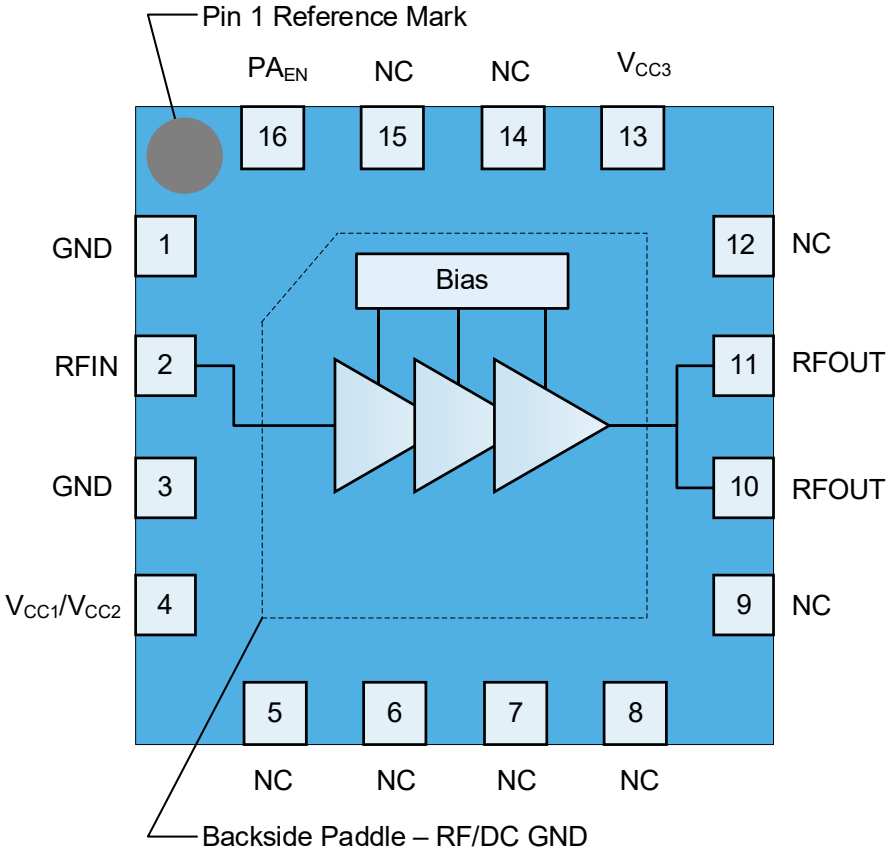








Pad Configuration and Description

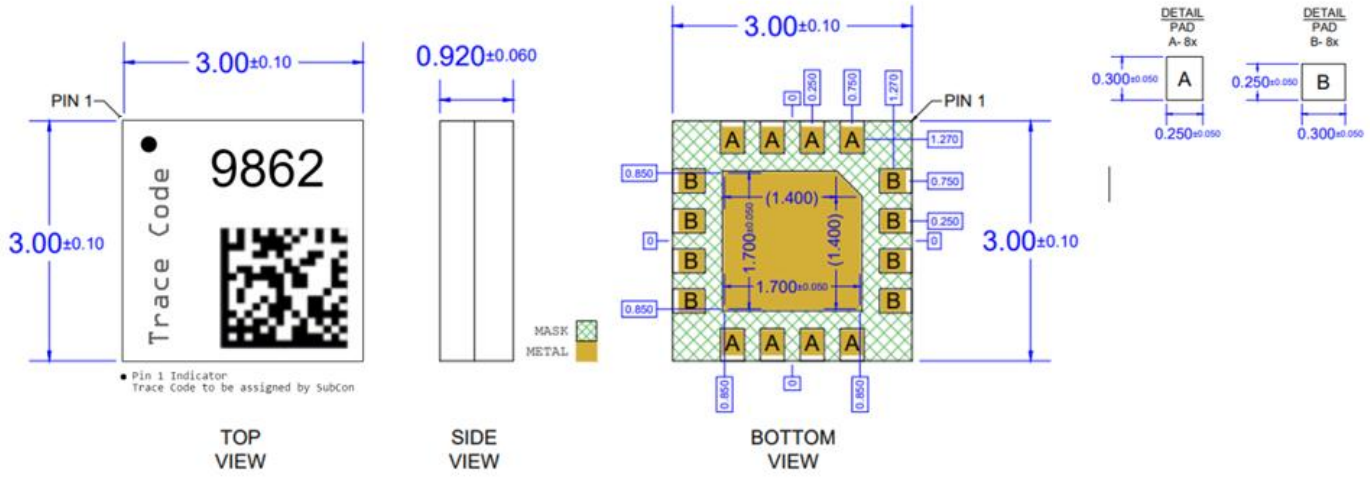


Top View

Pad No.	Label	Description
5, 6, 7, 8, 9, 12, 14, 15	NC	No electrical connection internally. It may be left floating or connected to ground. Land pads should be provided for PCB mounting integrity.
2	RFIN	RF input, internally matched to 50Ω and DC blocked.
1, 3	GND	RF and DC ground connection.
4	V_{CC1} / V_{CC2}	First and second stage DC supply voltage.
10, 11	RFOUT	RF output. DC block capacitor required.
13	V_{CC3}	Third stage DC supply voltage.
16	PA_{EN}	PA on/off logic control.
Backside Paddle	GND	RF/DC ground connection. The back side of the package should be connected to the ground plane through as short of a connection as possible. PCB vias under the device as many as possible are recommended. Refer to PCB layout pattern recommendation page.

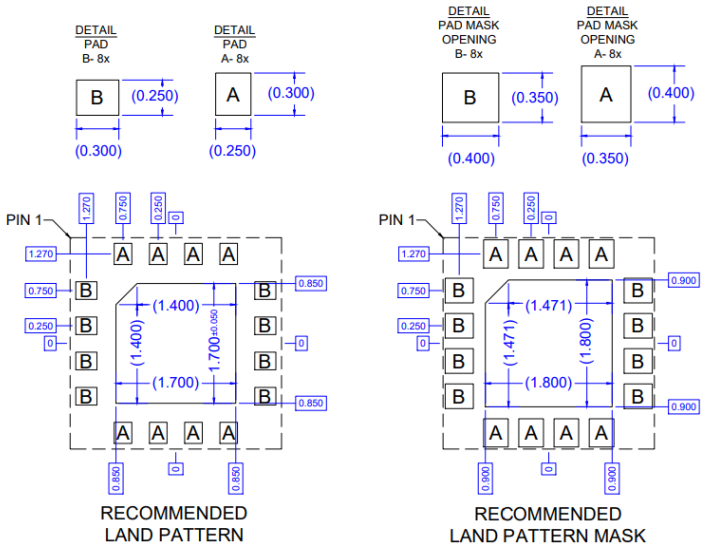
Package Marking and Dimensions

Marking: QR Code – Contains device traceability information
Part No. – A9862
Trace Code to be assigned by sub-contractor



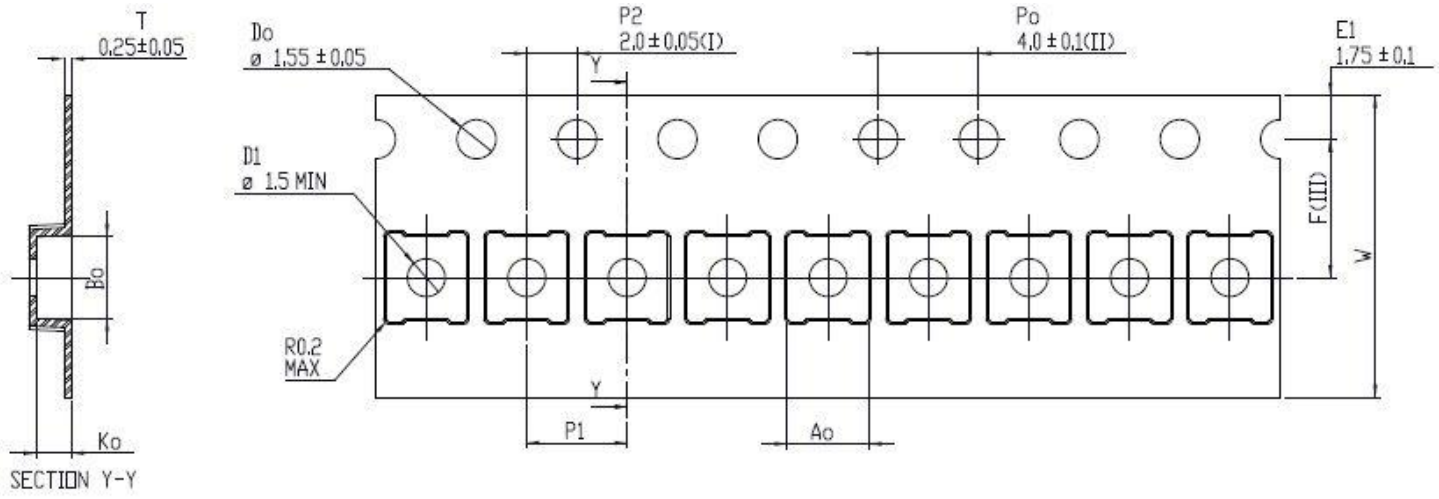
Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Contact plating: ENEPIG

Recommended PCB Layout Pattern



Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Via holes are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.01").
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

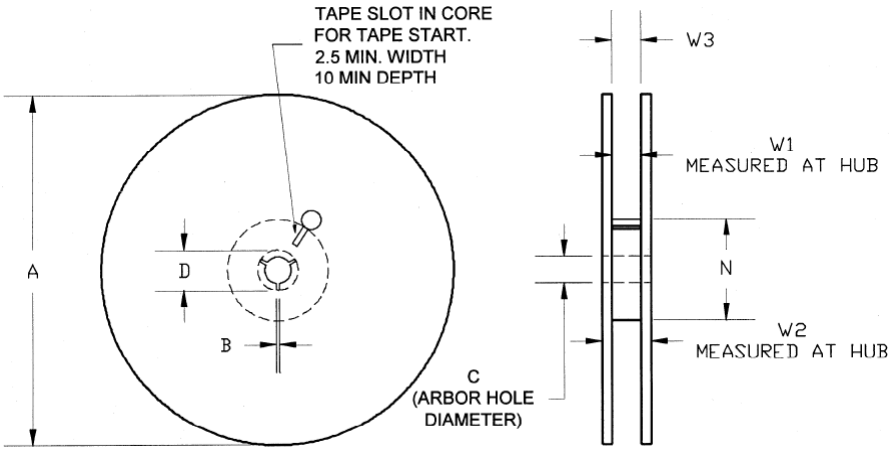
Tape and Reel Information – Carrier and Cover Tape Dimensions



Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.128	3.25
	Width	B0	0.128	3.25
	Depth	K0	0.055	1.40
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.217	5.50
Cover Tape	Width	C	0.362	9.20
Carrier Tape	Width	W	0.472	12.00

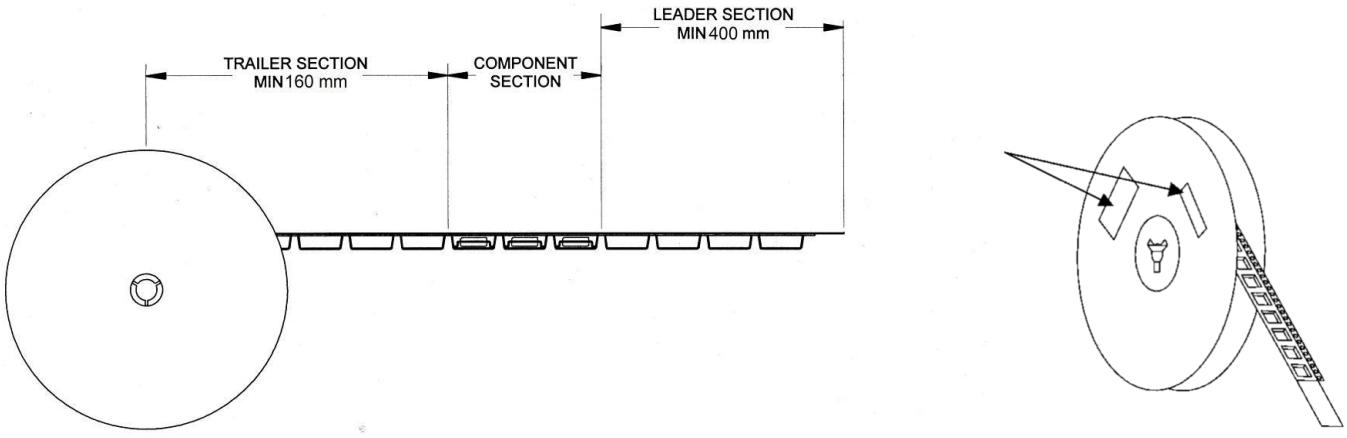
Tape and Reel Information – Reel Dimensions

Standard T/R size = 2,500 pieces on a 7” reel.



Feature	Measure	Symbol	Size (in)	Size (mm)
Flange	Diameter	A	6.969	177.0
	Thickness	W2	0.717	18.2
	Space Between Flange	W1	0.504	12.8
Hub	Outer Diameter	N	2.283	58.0
	Arbor Hole Diameter	C	0.512	13.0
	Key Slit Width	B	0.079	2.0
	Key Slit Diameter	D	0.787	20.0

Tape and Reel Information – Tape Length and Label Placement



Notes:
1. Empty part cavities at the trailing and leading ends are sealed with cover tape. See EIA 481-1-A.
2. Labels are placed on the flange opposite the sprockets in the carrier tape.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	1C	ESDA / JEDEC JS-001-2017
ESD – Charged Device Model (CDM)	C3	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	MSL3	IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

Solderability

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

Contact plating: ENEPIG

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Product uses RoHS Exemption 7c-I to meet RoHS Compliance requirements
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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